RETHINKING CHILDHOOD
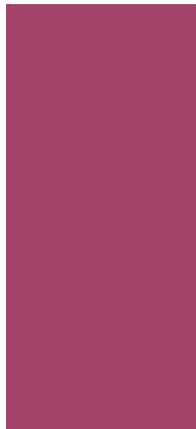
INTERDISCIPLINARY RESEARCH IN TEACHING AND LEARNING

New Perspectives and Approaches
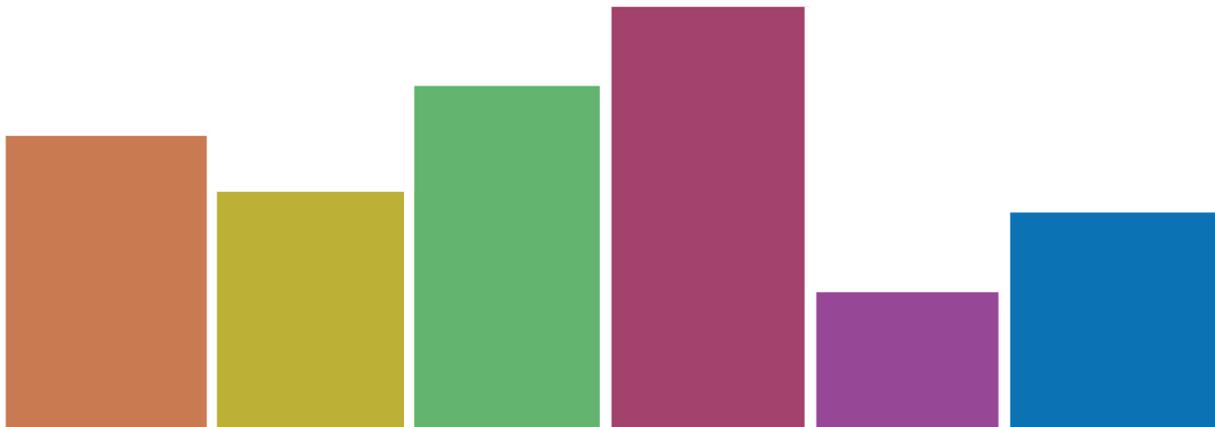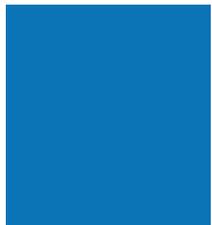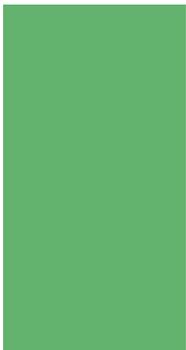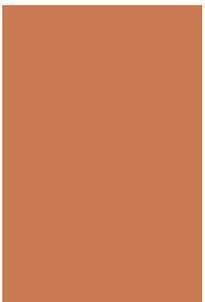
University of Maribor
Faculty of Education

University of Zadar
Universitas Studiorum
Jadertina | 1396 | 2002 |

Interdisciplinary Research in Teaching and Learning

New Perspectives and Approaches

Editors
Miha Marinšek
Maja Hmelak

September 2024

This publication has undergone a double-blind peer review per proceeding.

Table of Contents

STEM IN EDUCATION

GENERAL EDUCATION

COMPETENCES FOR DEMOCRATIC CULTURE IN EDUCATIONAL SYSTEM: EXPERIENCES FROM SERBIA

SVETLANA LAZIĆ,[1] SNEŽANA VUKOVIĆ[2]
[1] Preschool Teacher Training College Novi Sad, Novi Sad, Serbia
pedagogns@gmail.com
[2] Ministry of Education of Republic of Serbia, Belgrade, Serbia
snezanavukovic2@gmail.com

The purpose of this paper is to overview new research in Serbia on the topic of education for implementing children's rights in schools and interdisciplinary competences in teaching for determining the presence of knowledge, implementation and beliefs in the child's possibilities and potentials to the end of improving educational work. The analysis is based on understanding the dimensions of values, attitudes, skills and critical thinking, as competences for democratic culture and their implementation in environments which support participation. The educational system should be this kind of environment. The Council of Europe Referent Framework of Competences for Democratic Culture (RFCDC) is a set of materials about principles and implementation of all 4 dimensions in educational institutions, through the real-life situations which enable some or all dimensions' implementation. The imperative is grounded theory knowledge of rights in general and child's rights too. Authors conclude that relation of non-equal power is dominant in educational work, which implicitly means that there is a lack of knowledge of aim and significance of some child's rights, possibly the Convention itself.

University of Maribor Press

KOMPETENCE ZA DEMOKRATIČNO KULTURO V IZOBRAŽEVALNEM SISTEMU:IZKUŠNJE IZ SRBIJE

SVETLANA LAZIĆ,[1] SNEŽANA VUKOVIĆ,[2]
[1] Visoka šola za vzgojitelje predšolskih otrok Novi Sad, Novi Sad, Srbija
pedagogns@gmail.com
[2] Ministrstvo za šolstvo Republike Srbije, Beograd, Srbija
snezanavukovic2@gmail.com

Cilj prispevka je pregled novih raziskav v Srbiji na področju izobraževanja o uresničevanju otrokovih pravic v šolah in medpredmetnih kompetenc pri pouku zaradi ugotavljanja prisotnosti znanja, izvajanja in verjetja v otrokove možnosti in potenciale z namenom izboljšanja vzgojno-izobraževalnega dela. Analiza temelji na razumevanju dimenzij vrednot, stališč, spretnosti in kritičnega mišljenja, ki tvorijo kompetence za demokratično kulturo in se izvajajo v okoljih, ki podpirajo participacijo. Vzgojno-izobraževalni sistem bi moral biti takšno okolje. Referenčni okvir kompetenc za demokratično kulturo Sveta Evrope (RFCDC) je zbirka gradiv o načelih in izvajanju vseh štirih dimenzij v izobraževalnih ustanovah, in sicer s pomočjo prikazovanja realnih situacij, ki omogočajo izvajanje nekaterih oziroma vseh dimenzij. Nujen pogoj za njihovo uporabo je dobro poznavanje koncepta prava na splošno, vključno z otrokovimi pravicami. Avtorji ugotavljajo, da v vzgojno-izobraževalnem delu prevladuje razmerje neenake moči, kar posredno pomeni, da je pomanjkljivo razumevanje smisla in pomena nekaterih otrokovih pravic, morda tudi nepoznavanje same konvencije.

1 Introduction

Education for the rights of the child can be viewed in the wider framework of human rights education, because rights of the child are a part of the overall corpus of human rights. However, education for the rights of the child is not the same as education for human rights. If children and students learn about human rights without content interaction and experiential knowledge, they are denied the opportunity to understand the rights of the child, i.e. a valid understanding of the position in which they are and the opportunities they have in applying everything that concerns them (Vranješević, Cicvarić, Žunić-Cicvarić & Jovanović, 2022). This further means that children and students in educational institutions need to be given a context based on everyday experiences, in order to be able to exercise their rights adequately and in line with their needs.

One should also wonder if the teachers in schools are ready to do this, and whether there are any obstacles that can be recognized as difficult to surpass. It seems that the competences of teachers which refer to the attitudes and values that the teacher knows how to use in the performance of his professional activities can be one such obstacle (Gonzáles &Wagenaar, 2008). They go beyond the scope of teaching curricula and form the backbone of community life in which the teacher acts as supporter to the child or student. The dominant questions in this paper are: (1) the extent to which teachers are prepared to work on education for children's rights; (2) whether they are committed to the teaching vocation and are aware of their authority to achieve the objectives of education, tasks and content prescribed by law; (3) how much they 'see' children and whether they fully understand the complementarity of their relationship with children; (4) whether schools perceive their culture/ethos as the starting, as well as progressive development point for the application of children's rights in practice and (5) whether they believe school is a place in which it is possible to achieve democratic culture.

Although there is not a large body of research in Serbia focusing on the aforementioned questions, there is sufficient material to be able to determine the tendencies of teachers' actions in school and discover gaps in knowledge as suitable points for practical intervention to the end of strengthening their faith in children, seizing opportunities and realising their potential.

2 Methodology

This study was made as theoretical research and as a system of logical and value exploration of human and children's rights, teacher's competences, complementary issues in relationship, as well as context of democratic culture in schools. It is made within the corpus of hermeneutic and explorative paradigm, which allow deeper understanding of important questions mentioned above, relevant for increasing the positive values in education.

This research is realised as overview of (1) new researches in Serbia and foreign contemporary researches, (2) activities in schools provided by Ministry of Education in co-ordinance with Institute for Improvement of Education and Council of Europe related to democratic culture and professional development and (3) by consulting legislative framework and strategic documents relevant for new educational paradigm and national educational policy.

3 Results

Results are divided in four major units related to the topic of the study. Each of them demonstrates a degree of autonomy, but at the same time depends on others and forms one part of a whole. By simultaneously assessing them individually and as part of a whole, it becomes quite clear they are constituent to the comprehensive knowledge of teachers and students. They also confirm the necessity for continuous improvement of the quality of work in a highly ethically demanding profession that teaching is.

3.1 Education for children's rights and competencies

According to research that examined the issue of student participation in Serbia (Avramović, Stamenković, 2013; Vranješević, 2014; Vuković, Čaprić & Lazić, 2023) there is an impression that the current school climate does not yet encourage student activism nor does it seriously contribute to the strengthening of their participation skills. Despite reforms which emphasise the importance of democratising education and establishing partnerships (IDEC, 2005), some schools in Serbia still lack the practical knowledge for providing opportunities for students to actively participate in the life and work of the school. On the other hand, some countries show

significant improvement of decision-making opportunities for young people in school, even in the early childhood classrooms (Marsh, et al., 2020; Suorsa, 2023). However, there are exceptions. Opportunities for student activity exist only in contexts which presuppose free choice and initiative of students (extracurricular activities), while other segments of educational work "close the door" to student participation (Klemenović, Lazić, 2007), which is confined to the formal existence of student parliaments. In the survey conducted by the Provincial Ombudsman, in over 50% of the 344 primary schools in AP Vojvodina, the student parliament never came to life (*Report of the Provincial Ombudsman for 2005*, 2006). In the schools where it existed, the work of the student parliament was based mainly on meetings, discussions, encounters usually initiated by the president of the student parliament. The meetings mainly took place in the presence of an adult from school (most often the pedagogue), which in the opinion of the students leads to reduced independence of this body. In the 117 secondary schools of APV at the time, high school student participation in the life and work of the school was realised in several ways, with the most common responses: student parliament, organisation of school events, peer education, participation in technical activities of the school, participation in school development planning, organising excursions and various other initiatives and activities. The student parliament existed in almost all schools and their representatives equally participated in school board meetings (Klemenović, Lazić, 2007).

According to some studies (Pešikan, 2020; Rowe, 2003; Vranješević et al., 2022), key determinants of success in schools are the values foundational to the education for the rights of the child, such as the involvement of students in various aspects of school life and in the learning and teaching process, respect and cooperation with different actors of the educational process and the inclusiveness of the learning environment (Schaffer & Gagnon, 2023). Some authors emphasised the importance of empowering children and adults to acquire competencies for progressive realisation of children's rights through learning about them (Lundy & McEvoy, 2012), i.e. to launch initiatives in defence of human rights and prevent their violation, thus introducing the concept of initiatives which train children and adults to bring about changes in their environment (Gerber, 2008; Vranješević et al., 2022).

The study of the Provincial Ombudsman of Vojvodina conducted in 2009 was repeated eight years later in the same residential areas. It was concluded that there was no qualitative step forward in students' understanding of rights, constitutional democracy and the protection of national minorities' rights to free thinking and expression, with almost half of the respondents in the repeated study justifying discrimination as a measure (Lazić & Perić, 2017, 2018). The focus on information and cognitive content has dehumanised schools and distanced them from students. Therefore, they cannot perceive school as a place where something significant and necessary for life happens, but rather see it as an occupation intended for everyone in equal form and measure (Obenchain et al., 2016; Tošić Radev and Pešikan, 2017). There is an evident need to connect schools to the community and to introduce programmes that would bring the school closer to life and equate academic achievements to social, emotional and other competencies (Murry and Isaacowitz, 2016; Shepherd, Luebbers and Ogloff, 2016). In this way, schools could improve the care for others, self-awareness, differentiation of terms related to human and children's rights, which was observed mostly in students belonging to the Ruthenian national community and partially in students attending Civic Education as a compulsory elective course in the repeated study (Lazic & Perić, 2017, 2018).

Consequently, Bajaj (2012) and Vidović et al. (2005) believe that the education system needs competent and enthusiastic teachers who will be able to respect and use the principle of equality and participation in creating an environment conducive to the implementation of children's rights through experiential learning. Competencies are a combination of knowledge, cognitive and practical skills, attitudes and values that a teacher can use in the performance of their professional activities (Gonzales & Wagenaar, 2008). Since they depend on the political and economic system and society in the context of cultural diversity, they are applied through intercultural and interpersonal dialogue. According to a definition similar in content, competencies are divided into 4 constituent groups / areas, namely values, attitudes, skills, as well as knowledge and critical thinking (Council of Europe, 2016; Gollob & Lazić, 2021a, 2021b). In the teaching context, they are perceived as the ability of teachers to mobilise and apply relevant values, attitudes, skills, knowledge and/or understanding and to respond appropriately and effectively to demands, challenges and opportunities in a given context (Council of Europe, 2016).

Foreign research that explore the competencies of teachers in child rights education shows that teachers have positive attitudes and that they base their teaching practice on the rights of the child, while at the same time expressing a desire to acquire knowledge about the rights of the child (Aroa & Thakur, 2015; Ozmen, Kaymak, Ozmen & Yalcin, 2010; Shahid, 2009). The latest study in Serbia (Vranješević et al., 2022) revealed that almost half of teachers lack sufficient knowledge on the rights of the child directly related to the education system, that two thirds fail to adequately apply knowledge about children's rights in a specific situation, and that they do not possess knowledge of the procedures for acting in cases of children's rights violation. In contrast, the same teachers express dominantly positive attitudes towards child rights education.

3.2 The authorities of teachers in achieving the goals of education and upbringing for the purpose of cultivating democratic culture

It is clear that learning for the application of CDC starts from the cognitive dimension, i.e. from knowledge, so students can later be equipped to conclude for themselves that learning and development are not only based on knowledge and skills, but also on values and attitudes. If the educational process is not just perceived as the accumulation of previously acquired knowledge, but as the support to the development of competencies for life, students grow and learn in a world where they feel welcome and are enabled to find their own perspective of the world, founded on appreciation and acceptance of authenticity. In order to do so, the educational process needs to be connected to the life experiences of students, and teachers need to upgrade those experiences into the context of the educational institution and apply them in the life and work of the school. If the school is governed as a mini-community with principles of democratic governance, it can provide students with opportunities for participation and application of its basic postulates. As such, the school, thanks to the engagement of teachers, can facilitate student development, helping students grow into aware, active drivers of their own life, who have respect for themselves and others, and who will become citizens equipped to recognize and define the problem situation, capable of taking care of themselves, and aware of the support systems around them (Vukovic et al., 2023). This further means that the school, as an institution of clearly defined formal education, provides valuable opportunities for informal learning, gaining life experience and creating a personal framework of reference. This process is also reversible, equally affecting both

students and teachers. It is important to note that the Guidelines for the Integration of the Reference Framework of Competences for Democratic Culture (RFCDC) in selected teaching and learning programmes (Council of Europe, 2022) provide examples of the implementation of CDC in primary and secondary schools in following subjects: Serbian language/ Serbian language and literature, mathematics, the world around us / nature and society, foreign language, history, geography, physics, chemistry, psychology and civic education that are associated with 477 descriptors.

3.3   Complementarity of relationships and challenges

Numerous studies emphasise that the quality of the educational process, educational outcomes and student motivation are greatly dependent on the teacher. They determine the extent to which educational policies and policies in the field of protection and implementation of children's rights will be implemented in practice. This also entails that teachers can be both obstacles and advocates for children's rights education and participation in the life of students during their stay at school (Ball, Maguire & Brown, 2012; Leenders, Veugelers & De Kat, 2008; OECD, 2005). The teaching profession requires specific professional knowledge that is not demanded to such an extent in other professions. Coupled with the complexity of modern life, the specificity of the teaching profession complicates their professional development, reducing it to multiple sources and forms (Pešikan, 2002). Therefore, it is not by chance that the quality of the teacher's work and the student achievement is highly correlated. Knowing that education is one of the most important antidotes for the diseases of the 21st century - violence, racism, extremism, xenophobia, discrimination and intolerance – it has one of the most important roles in promoting democracy, human rights, the rule of law, as well as the prevention of human rights violations (Council of Europe, 2010).

The teacher is viewed as a person of support to the students, since they empower them to make progress and realise qualitatively good achievements. Every teacher who is guided by the general pedagogical principle of positive direction for all activities understands that they are the stronghold of children's rights and that they help children discover their strengths, emphasising and relying on them, encouraging them to further develop them and thus reduces tendencies of children to deviate from positive values and ideas to which the educational practice aspires.

The teacher-student relationship is complementary, which means that it is characterised by an imbalance of power. Such situations unevenly distribute the burden of responsibility to the more powerful side – the teacher. As such, the teacher supports the student in their development, provides them with opportunities for learning and development, to the end of observing the significance of change and its fine nuances. In this process, the competencies that students need to change society and shape the future for a better life emerge. They are recognized as "transformative competencies" (OECD, 2018a, 2018b) joining the core foundation of knowledge, values and attitudes (Table 1).

Table 1: Transformative competences and core foundations

Transformative competencies	Core foundation	Areas
Creating new values Calming tensions and dilemmas Taking responsibility	Knowledge Attitudes Values	Cognitive basis: a widely viewed literacy within which digital literacy and data operations develop
		Health basis: physical and mental health and well-being
		Emotional basis: morality and ethics
Cross-subject competencies		

Creation of new values, calming tensions and dilemmas and taking responsibility are recognized as transformative competences (OECD, 2018a). The core foundation areas are broadly regarded literacy (cognitive basis), physical and mental health (health basis), morality and ethics (emotional basis) (OECD, 2018b). Transformative competencies and the core foundation precisely include the elements of life skills that are actually sets of competences independent of the teaching subjects in school (OECD, 2018b) We know them under the name of cross-curricular competencies. Their development encourages students to see reality from different perspectives, to find connections and relationships between different subjects and to connect them with previous learning and their own experiences (*Defining Cross-Curricular Competences*, 2013). They depend on the level of formal education, educational profile and competencies that future professionals should have. What they have in common is that they are based on key competencies for a fulfilling and successful life and proper functioning of society, as well as for lifelong learning.

3.4   Democratic culture in schools

The *Law on the Basics of the System of Education* (2017), more precisely Article 51, prescribes the professional development and further specialisation training of teachers, educators and professional associates. In addition, the field of professional development is regulated by the latest *Rulebook on Continuous Professional Development and Advancement in the titles of teachers, educators and professional associates* (2021). Among the prescribed competencies are the K4 related to competencies for communication and cooperation. Among the priority areas is area P4, which refers to strengthening the educational role of educational institutions through the development of programs for the prevention of violence, discrimination, abuse and neglect. As part of their professional development, teachers have the obligation to attend training for the prevention and protection against discrimination, violence, abuse and neglect, constructive conflict resolution, nonviolent communication, tolerance, stereotypes and prejudice, which also relate to the prevention of hate speech. In the *Catalogue of professional development programs for employees in education for the school years 2018-21* there are a total of 32 programmes related to human rights (ZUOV, 2018). In contrast, in the *Catalogue of professional education programs for the school years 2022-25*, there are 95 programmes that are directly or indirectly associated with human rights (ZUOV, 2022) are accredited. The evident increase in the number of programmes shows the sensitivity of general, but also children's and human rights, as well as all other specific rights, makes them a topic of special interest for education professionals.

The new educational paradigm, which was adopted in 2018, is defined by Article 7 of the *Law on the Basics of the System of Education* (2017). It represents the beginning of education reform and promotes a new, outcome-oriented concept of teaching and learning. Key cross-curricular competencies have been introduced. The teaching and learning concept is directed at achieving the standards of achievement (Table 2).

Table 2: Cross-curricular competences

Cross-curricular competences	Responsible participation in a democratic society
	Communication
	Responsibility towards the environment
	Problem solving
	Cooperation
	Relationship to health

They represent the prevention and fight against discrimination, violent behaviour, hate speech. Teachers have obligations towards development of cross-curricular competencies in all teaching and extracurricular activities. These competencies represent a step further in understanding the subject matter and applying what is learned. The responsibility for the development of competencies falls on all teachers and teaching subjects. In addition, teachers within the mandatory elective program Civic Education and classes of the headmaster, connect and deal with topics related to stereotypes and prejudices, discrimination, prevention of all forms of violence, abuse and neglect, children's rights, tolerance. With the aim of improving the competence of teachers who teach Civic Education, three manuals have been developed – for the first and second cycle of primary education and for grammar schools. The teacher receives basic information for all topics, on the correct use of terms that are important in this area (tolerance, diversity, discrimination, gender, gender roles, sexism...), information on gender and stereotypes and prejudices on national and racial grounds, on gender discrimination and discrimination based on national and ethnic affiliation, as well as the proper reactions to each violation. They also cover topics in the field of gender-based violence against women and accompanying phenomena, peer violence, as well as information on institutionalised mechanisms for ensuring gender and any other equality, regulations prohibiting discrimination in Serbia, *The Convention on the Rights of the Child*, as well as information on regulatory mechanisms for the response of schools in cases of discrimination and gender-based and any other form of violence. Beyond this, there are interesting texts on how the media shape gender and every other stereotype, on the most common myths and facts about gender-based violence, on the phenomenon of bullying, on the results of research on attitudes of young people towards violence in general, especially gender roles and gender-based violence, as well as a list of the most common signs of violence.

Within the Joint Initiative of the Council of Europe and the European Union, through the project "Quality Education for All", a framework of twenty competences from the Competence Model from the value group, group of attitudes, skills group and knowledge and critical understanding group was adopted. Schools organised a large number of diverse activities, with pedagogical approaches appropriate for the development of competences for democratic culture and creation of a more pleasant, a more interesting and safer school environment, while strengthening their capacities for eliminating violent, discriminatory and anti-

democratic structures in schools and the school environment, improving the school ethos and providing support to students. Examples of content that reach democratic competencies can be found in publications for parents and teachers on the website of the Ministry of Education. During 2022, 20 new advisors-external associates were hired for the implementation of CDC in schools. During 2022 and 2023 2400 teachers and professional associates improved their knowledge and skills for the implementation of CDC in schools. In the meantime, the RFCDC has become a part of the *Strategy for the Development of Education and Upbringing until 2030* (2021).

4   Discussion

The biggest difference between research abroad and in Serbia is that the results of foreign studies are based on self-assessment of respondents, while only researchers in Serbia standardised responses and reached a realistic state in practice. For that reason, knowledge of children's rights among teachers in Serbia is weaker and less applied in practice, which does not necessarily have to be true. Schools provide students with activities in the field of activism and inclusive practice, engaging them in socially beneficial and humanitarian work, but only as a form of corrective action, which they themselves expressed in the professional development program *Improving the work of SOS counsellors for reporting violence in schools* (ZUOV, 2023). This demonstrates knowledge of relevant procedures for the handling of such situations, but opens the need to expand the image and apply them in an affirmative direction. *Rulebook on performing socially useful, i.e. humanitarian work* (2018) is defined as a restorative measure, and this ordinance should be amended to become binding for the entire school. The school should organise socially beneficial and humanitarian work as part of activities for acquiring values, dedicated to all students.

Guidelines for the Integration of the Reference Framework of Competences for Democratic Culture (Council of Europe, 2022) and *A guide to achieving a democratic culture in schools* (Council of Europe, 2023) allow implementation and improvement of universal democratic values in schools. It is especially important for science subjects like mathematics, physics, biology, chemistry, as such topics can be used to talk to students about important questions related to critical thinking that can enable creativity. Questions and discussion of topics like tolerance, equality, relativity, sensitivity and other, increase the interest of students in teaching units and improve their knowledge, and

at the same time lead them to positive values of the national educational system and its foundational moral values.

In the cross-curricular competencies framework, education is considered to influence and be influenced by the context in which it occurs (*Defining Cross-Curricular Competences*, 2013). It takes place within the unique context of each student's life, occurring in interpersonal interaction experiences of students outside the classroom. In this way, what students learn within the school system has the potential to enrich their comprehensive development, as it occurs in their school years, and in the preparation for their future lives and further learning. Education perceived in the context of cross curricular competencies represents the prevention and fight against discrimination, violent behaviour, hate speech. Besides that, it is a step towards understanding and applying lessons learned, which is why all teachers are obliged to develop cross-curricular competences and why all teaching subjects are suitable for this purpose.

The STEM programme is dedicated to all students, but in practice shows a high range of gender inequality. The context of all topics presented in this study as a whole and each of them separately, has the potential for significant quantitative and qualitative improvement. Within this programme students can foster inquiring minds, logical reasoning and collaboration skills and can achieve gender equality as a principle of children's rights. According to Schaffer and Gagnon (2023), it improves democratic culture in schools and offers an assistive approach to nuancing democracy in terms of participation, inclusion, equality, freedom, development. Each of them contains important issues related to sustainable development, specified by the UN *Incheon Declaration and Framework for Action* (2016) and UNESCO's *Education for Sustainable Development* (2020).

5   Conclusion

It can be concluded that the paper answers all the questions expressed in the introductory part. This study determined the tendency of teachers' readiness to work on education for children's rights, regardless of perceived deficiencies in knowledge. Teachers are aware that they are committed to the teaching vocation and their duty to achieve the goals of education, tasks and content prescribed by law, and see the school as a community of formal education, but also its role in informal learning,

suitable for practising life experiences. If they are able to provide a qualitatively good assessment of their profession, they are aware of their responsibility in a complementary relationship and really see children, and, through personal engagement in understanding themselves and reality, encourage them to connect teaching content with life experiences. They see school culture or ethos as the origin and place of progressive development of child rights in practice, which can be achieved by applying laws and other strategic documents. Teachers can see school as a place for realising democratic culture only if the whole school constitutes such a context. This provides them with opportunities to apply knowledge in this field, which implies the need to modernise schools and reduce them to the level of various forms of advancement in the context of lifelong learning. Teachers' faith in the well-being of their profession was confirmed, and the layering of the teaching profession and its importance in the strategy of development of society were further emphasised.

References

Aroa, S., Thakur, R. (2015). A study on knowledge of child rights among teachers of primary school in Jammu. *American International Journal of Research in Humanities, Arts and Social Sciences, 12*(1), 24–28.

Avramović, M., Stamenković, A. (2013). School and museum in human rights education. In: Ž. Krnjaja, D. Pavlović-Breneselović and K. Popović (Ured.), *Pedagogue between theory and practice. Proceedings* (str. 116-120). Belgrade: IPA, Pedagogical Society of Serbia.

Bajaj, M. (2012). *Schooling for social change: The rise and impact of human rights education in India.* London & New York: Continuum.

Ball, S. J., Maguire, M. & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools.* Oxfordshire: Routledge.

Council of Europe (2010). *Charter on Education for Democratic Citizenship and Human Rights Education.* Retrieved August 23, 2023 from the World Wide Web https://www.coe.int/en/web/edc/charter-on-education-for-democratic-citizenship-and-human-rights-education

Council of Europe (2016). *Competences for Democratic Culture.* Strasbourg: Council of Europe. Retrieved November 17, 2020 from the World Wide Web https://www.living-democracy.com/wp-content/uploads/2019/10/CDC_EN.pdf

Council of Europe (2023). *A guide to achieving a democratic culture in schools.* Retrieved September 23, 2023 from the World Wide Web https://prosveta.gov.rs/wp-content/uploads/2023/09/Vodic_za_podsticanje_demokratske_kulture_web.pdf

Council of Europe, ZUOV (2022), *Guidelines for the integration of the reference framework of competences for democratic culture.* Retrieved June 17, 2023 from the World Wide Web https://prosveta.gov.rs/wp-content/uploads/2022/07/COE_Kvalitetno-obrazovanje-za-sve_publikacija.pdf

Defining Cross-Curricular Competences (2013). British Columbia: Ministry of Education. Retrieved October, 15, 2023 from the World Wide Web https://www.bced.gov.bc.ca/irp/docs/def_xcurr_comps.pdf

Gerber, P. (2008). *From convention to classroom: The long road to human rights education. Measuring states' compliance with international law obligations mandating human rights education.* (1 ed.) Saarbrucken Germany: VDM Verlag.

Gollob, R., & Lazić, S. (2021a). *Growing up in a Democratic Family. A manual for parents with sections on ages 6-10 and 11-14.* Council of Europe, Ministry of Education in Republic of Serbia. Link: https://childhub.org/sites/default/files/library/attachments/HF27-growing-up-democratic-family-ENG%20%281%29.pdf

Gollob, R., & Lazić, S. (2021b). *Living in a Democratic Family. A manual for parents of adolescents age 15 to 19.* Council of Europe, Ministry of Education in Republic of Serbia. Link: https://rm.coe.int/hf27-living-democratic-family-eng/1680a41644

Gonzáles, J. & Wagenaar, R. (2008). *Universities' contribution to the Bologna Process.* An introduction. (2nd edition). The University of Deusto.

IDEC (2005). *Democratic Education.* Link: https://www.idenetwork.org/index.php/about/what-is-democratic-education

Klemenović, J., Lazić, S. (2007). Human rights education in our school. In: O. Gajic (Office), *European dimensions of changes in the education system in Serbia. On the way to the "Europe of Knowledge"* (p. 39-53). Novi Sad: Faculty of Philosophy.

Law on the basics of the education system (Official Gazette of RS No. 88/2017). Available at: https://www.paragraf.rs/propisi/zakon_o_osnovama_sistema_obrazovanja_i_vaspitanja.html

Lazić, S. & Perić, D. (2017). How many high school students know the rights of national minorities? *Pedagogy, 72*(2), 155-165.

Lazić, S. & Perić, D. (2018). The impact of elective teaching and national affiliation of pupils of secondary schools of AP Vojvodina on knowledge of human rights. *Pedagogy, 67*(4), 577-589.

Leenders, H., Veugelers, W. & De Kat, E. (2008). Teachers' views on citizenship education in secondary education in the Netherlands. *Cambridge Journal of Education, 38*(2), 155–170. doi: 10.1080/03057640802063106

Lundy, L. & Mcevoy, l. (2012). Children's rights and research processes: Assisting children to (in)formed views. *Childhood, 19*(1), 116–129. doi: 10.1177/0907568211409078

Marsh, M. M. , Kenyon, E. A. , Cardy, T. & West, E. M. (2020). That's My Voice! Participation and Democratic Citizenship in the Early Childhood Classroom. *Democracy and Education*, 28 (2), Article 1.

Obenchain, K.M., Balkute, A., Vaughn, E. & White, S. (2016). High School Teacher's Identities: Constructing Civic Selves. *The High School Journal, 99*(3), 252-278.

OECD (2005). *Teachers matter: Attracting, developing and retaining effective teachers.* Paris: OECD.

OECD (2018a). *Transformative competencies for 2030.* Retrieved July 7, 2023 from the World Wide Web https://www.oecd.org/education/2030-project/teaching-and-learning/learning/transformative-competencies/Transformative_Competencies_for_2030_concept_note.pdf

OECD (2018b). *Core foundations for 2030.* Retrieved July 7, 2023 from the World Wide Web https://www.oecd.org/education/2030-project/teaching-and-learning/learning/core-foundations/Core_Foundations_for_2030_concept_note.pdf

Ozmen, A., Kaymak Ozmen, S. & Yalcin, T. (2010). Prospective teachers' knowledge level and knowledge needs about child rights issue. Procedia Social and Behavioral Sciences, 9, 81–86. doi:10.1016/j. sbspro.2010.12.119.

Pešikan, A. (2002). Professional development of teachers – what's new here? *News from school, 43*(5), 115-120.

Pešikan, A. (2020). *Learning in an educational context.* Belgrade: Official Gazette.

Report of the Provincial Ombudsman for 2005 (2006). Novi Sad: Provincial Ombudsman.

Rowe, K. (2003). The importance of teacher quality as a key determinant of students' experiences and outcomes of schooling. *Australian Council for Educational Research (ACER) Research Conference*

(pp.15–20). Retrieved September 12, 2023 from the World Wide Web
https://research.acer.edu.au/research_conference_2003/3/

Rulebook on Continuous Professional Development and Advancement in the titles of teachers, educators and professional associates (Official Gazette of RS, no. 109/2021).

Rulebook on performing socially useful, i.e. humanitarian work (Official Gazette of the RS, no. 68/2018).

Schaffer, F.C. & Gagnon, J-P. (2023). Democracies Across Cultures. *Democratic Theory, 10*(1). DOI: https://doi.org/10.3167/dt.2023.100107

Shahid, M. S. (2009). Knowledge, attitudes and practices of primary school teachers regarding the rights of children. *Journal of Elementary Education, 19*(1–2), 25–50. doi: 10.18510/hssr.2021.93124

Strategy for the Development of Education and Upbringing by 2030 (Official Gazette of RS No. 63/21). Retrieved May 13, 2023 from the World Wide Web
http://demo.paragraf.rs/demo/combined/Old/t/t2021_06/SG_063_2021_001.htm

Suorsa, A. (2023). Places for Young People to Influence Decision-Making: Developing Means for Democracy Education in Finland. *Democracy and Education, 31* (2), Article 2.

Tošić Radev, M. & Pešikan, A. (2017). "Missing Piece" in the Process of Education: Socioemotional Learning. *Teaching and Upbringing, 66*(1), 37-54. doi: 10.5937/nasvas17010371

UN (2016). *Incheon Declaration and Framework for Action*. Retrieved on July 17, 2019 from the World Wide Web https://uis.unesco.org/sites/default/files/documents/education-2030-incheon-framework-for-action-implementation-of-sdg4-2016-en_2.pdf

UNESCO (2020). *Education for Sustainable Development. A roadmap*. Printed in France.

Vidović, S., Golić, M., Ćuk Milankov, D., Trikić, Z., Vranješević, J., Koruga, D. (2005). *Learn to score*. Belgrade: GTZ.

Vranješević, J. (2014). The Child Between Protection and Autonomy: Protectionism or Liberationism? *Teaching and Upbringing, 64*(1), 33-44.

Vranješević, J., Cicvarić, R., Žunić-Cicvarić, J., & Jovanović O. (2022). Education for the rights of the child: Know, apply and believe. *Proceedings of the Institute for Pedagogical Research, 54*(2), 321-341. doi: 10.2298/ZIPI2202321V

Vuković, S., Čaprić, G., & Lazić, S. (2023). Application of cross-curricular competences in the teaching of physical and health education subjects in the context of external evaluation of schools. *Themes, 47*.

ZUOV (2018). *Catalogue of professional development programs for employees in education for the school years 2018-22*. Retrieved January, 14, 2021 from the World Wide Web https://zuov.gov.rs/katalozi-programa-stalnog-strucnog-usavrsavanja/

ZUOV (2022). *Catalogue of professional education programs for the school year 2022-25*. Retrieved January, 14, 2023 from the World Wide Web https://zuov-katalog.rs/

ZUOV (2023). *Improving the work of SOS counsellors for the prevention of violence in schools*. Program of public interest approved by the Minister under the number 610-00-00757/3/2022-07. Catalog number 5341. Available at: https://prosveta.gov.rs/wp-content/uploads/2022/07/COE_Kvalitetno-obrazovanje-za-sve_publikacija.pdf

OBJECTIVE MEASURES OF EXECUTIVE FUNCTIONS AS PREDICTORS OF ACADEMIC ACHIEVEMENT IN EARLY ADOLESCENCE

EVA KRANJEC,[1] MAJA ZUPANČIČ[2]
University of Maribor, Faculty of Education, Maribor, Slovenia
eva.kranjec@um.si
University of Ljubljana, Faculty of Arts, Ljubljana, Slovenia
maja.zupancic@ff.uni-lj.si

This study examined predictive relations of executive functions (EFs) with academic achievement in adolescents over a one-year period. One hundred and thirty-seven adolescents (53.3% girls, mean age 12.4 years) participated at T1, and 135 (51.8% girls) at T2. The Stroop Colour-Word, Backward Digit Span, and Trail Making Test were used to assess inhibition, working memory, and cognitive flexibility. Teachers provided data on the students' academic achievement. Results showed that a higher working memory span and a lower ratio score on Trail Making Test significantly predicted overall academic achievement and mathematics grades. In addition, a higher working memory span was associated with better grades in Slovenian language at T1, while cognitive flexibility predicted the respective grades at T2. However, no significant relationship was found between Stroop interference and academic achievement. The findings are discussed in the context of previous studies, and recommendations are made for improving EFs in the school context.

University of Maribor Press

Objektivne mere izvršilnih funkcij kot napovedniki učne uspešnosti v zgodnjem mladostništvu

Eva Kranjec,[1] Maja Zupančič[2]
[1] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
eva.kranjec@um.si
[2] Univerza v Ljubljani, Filozofska fakulteta, Ljubljana, Slovenija
maja.zupancic@ff.uni-lj.si

V raziskavi smo preučili napovedne zveze izvršilnih funkcij (IF) z učno uspešnostjo mladostnikov v obdobju enega leta. Ob začetku raziskave (Č1) je sodelovalo 137 mladostnikov (53,3 % deklet, povprečna starost 12,4 leta), eno leto kasneje (Č2) pa 135 mladostnikov (51,8 % deklet). Za oceno inhibicije, delovnega spomina in spoznavne prožnosti smo uporabili Stroopov barvno-besedni test, nalogo neposrednega pomnjenja števil nazaj in test sledenja. Podatke o učni uspešnosti mladostnikov so podali razredniki/razredničarke. Rezultati so pokazali, da obseg delovnega spomina in nižji razmernostni dosežek pri testu sledenja napovedujeta splošno učno uspešnost in ocene iz matematike. Večji obseg delovnega spomina se je povezoval z višjimi ocenami pri slovenščini (Č1), spoznavna prožnost pa je prav tako napovedovala višje ocene pri slovenščini v Č2. Med Stroopovo interferenco in učno uspešnostjo nismo prepoznali značilnih napovednih zvez. Ugotovitve smo interpretirali v kontekstu predhodnih študij in podali priporočila za spodbujanje IF v šolskem kontekstu.

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors of Academic Achievement in Early Adolescence

21

1   Introduction

Studies of executive functions in the fields of developmental psychology, neuroscience, and education have grown over the recent years. This increased attention stems from findings that emphasize the crucial role of these cognitive processes in various domains of a child's life, including cognitive and social development, development of independence, and academic achievement (Diamond, 2012). Defined as higher-order cognitive abilities, executive functions enable individuals independent and goal-directed behaviour (Blakemore et al., 2010; Lezak, 2004). They encompass a range of abilities, from adaptive thinking, updating and mentally manipulating information, inhibiting irrelevant stimuli, self-regulation, and the ability to plan and adjust behaviour in response to different contexts (Best & Miller, 2010). The development of executive functions, affected by the prefrontal cortex, undergoes rapid progression from early childhood until emerging adulthood (Goldstein et al., 2014; McCloskey et al., 2009).

The contemporary theoretical framework (e.g. Diamond, 2006; Miyake et al., 2000) proposes executive functions as a hierarchical construct and emphasizes three core components: inhibition, working memory, and cognitive flexibility. The interplay between these components facilitates progress in skills, such as planning, problem-solving, and adaptability in dynamic situations (Diamond, 2006). Given their importance, it is not surprising that these cognitive processes are instrumental in educational environments, where students are expected to sustain attention and manage different cognitive and behavioural challenges (Blair & Razza, 2007).

1.1   Inhibition

Inhibition, or inhibitory control, is the ability to regulate attention, thinking, behaviour, and emotion by consciously selecting desired stimuli and suppressing distractions. Central to inhibitory control is self-control, essential for resisting temptations, avoiding impulsive actions, and maintaining task consistency despite distractions (Diamond, 2013). Inhibition skills develop rapidly in childhood and further advance during early adolescence due to changes in the prefrontal cortex and axonal myelination (Anderson et al., 2001). These skills are vital for development of other EFs, such as working memory and cognitive flexibility. Laboratory tasks, including paradigms such as the Stroop task, the Go/No-Go task, the Flanker task,

and the Anti-saccade task (for a review, see Diamond, 2013), are mainly used to assess inhibitory control (Fosco et al., 2019).

1.2   Working memory

Working memory is a temporary storage system for perceived and processed information and facilitates content retention (Koritnik et al., 2014). It differs from short-term memory in that it stores perceived information and retrieves previously stored information from long-term memory. In addition, working memory allows for the manipulation of stored information under the supervision of the dorsolateral area in the frontal cortex (Gathercole et al., 2004). The working memory system underpins various cognitive functions such as language comprehension, calculation, task reorganization, information updating and decision-making (Diamond, 2013). Development of working memory starts in infancy, with marked improvements after age seven. By this age, children's working memory in terms of organization and strategy resembles that of adults, although their method of storing information continues to evolve (Gómez et al., 2018). Standard assessments to measure working memory include the backward digit span and N-back task, which demand high selective and sustained attention (for a review, see Diamond, 2013).

1.3   Cognitive flexibility

Cognitive flexibility involves considering several concepts simultaneously and switching between them. It allows one to adapt problem-solving approaches and adjust to new requirements or rules (Best & Miller, 2010). This ability relies on inhibition skills and working memory and supports thinking across boundaries and finding multiple solutions to problems. Cognitive flexibility undergoes rapid development in early childhood, primarily due to the exceptional adaptability and malleability of the cerebral cortex (Diamond, 2012). Switching between tasks is typically mastered by children around age 11, but cognitive flexibility continues to develop during adolescence and adulthood (Buttelmann & Karbach, 2017; Huizinga & van der Molen, 2007). Task-switching and set-shifting tasks, such as the Wisconsin Card Sorting Task or Trail Making Test, are commonly used to assess cognitive flexibility (for a review see Diamond, 2013).

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors
of Academic Achievement in Early Adolescence

23

1.4   Executive functions and academic achievement

Recent research shows that goal setting, planning, and organization skills are critical to school success (Huizinga et al., 2018). Numerous studies (e.g. Best et al., 2009; Miller & Hinshaw, 2010) highlight the profound effects of executive functions on academic success in typical and atypical children and adolescents. Researchers (e.g. Blair & Razza, 2007; Miller & Hinshaw, 2010) have found a relationship between measures of executive functions (namely inhibition, working memory, and cognitive flexibility) and early childhood achievement in mathematics and reading. Specifically, inhibition and working memory associate with achievement in these subjects in early childhood and first grade, whereas executive attentional control is more related to mathematical achievement in middle childhood (Duncan et al., 2007).

Similar results were found in late childhood and early adolescence studies. For example, van der Sluis et al. (2007) reported a positive relation between performance in updating, reading, arithmetic, and non-verbal reasoning in students aged nine to twelve. Task-switching ability was associated with improved non-verbal reasoning and reading. St. Clair-Thompson and Gathercole (2006) found that executive updating correlated with adolescents' verbal and visuospatial working memory tasks. In addition, working memory was closely related to English and mathematics grades, while inhibition was associated with grades in English, mathematics, and science. Ahmed et al. (2019) also underscored the predictability of working memory and emphasized its importance for academic achievement from early childhood to adolescence.

1.5   Objectives

Much of the research has focused on executive function and academic achievement in childhood, but scarce studies focus on adolescents (e.g. St Clair-Thompson & Gathercole, 2006). The relationship between the various components of executive functions and academic achievement in this age period calls for further exploration to offer findings that are crucial for educators and policymakers. In addition, the variety of objective measures used to assess specific components of executive functions in adolescents makes it challenging to directly compare results across different national and cultural contexts (Nyongesa et al., 2019; Poon, 2018). Based on the three predominant objective measures—namely, the Stroop Colour and

Word Test (SCWT) for inhibition, the Digit Span Backwards Task for working memory, and the Trail Making Test for cognitive flexibility (see Nyongesa et al., 2019 for details)—our study aimed to investigate the predictive relations of executive functions with adolescents' overall academic achievement and their school grades in specific subjects, i.e. in Slovenian language, mathematics, and foreign language. Moreover, we investigated these relations in both the current academic year and one year later.

2   Method

2.1   Participants

In the study, we assessed adolescents at two measurement occasions. At the time of the first measurement (T1), 137 students participated (M_{age} = 12.4 years, SD = 9 months); 73 were girls (53.3%) and 64 were boys (46.7%). At T1, these participants were in the 6th (38%), 7th (35.7%), or 8th (26.2%) grade of a nine-year elementary school in Slovenia, which enrols students aged 6 to 15 years. Regarding writing tasks, 91.2% were right-handed, 6.6% were left-handed, and one participant was ambidextrous. Only adolescents without special needs were included in the study to avoid bias in test results. One year later (T2), 135 students (51.8% girls) of the initial sample were re-assessed; two students had transferred to another school. Classroom teachers provided data on academic achievement for all participating students.

2.2   Measures

Objective assessment of executive functions was conducted using the PEBL computer program (The Psychology Experiment Building Language; PEBL; Mueller, 2013) - version 2.0 for MS Windows operating systems (http://pebl.sourceforge.net/).

The Stroop Colour-Word Task (SCWT; Stroop, 1935, as cited in MacLeod, 1991) is a well-established instrument to assess response inhibition, selective attention, and resistance to distracting stimuli in children and adolescents. Within the PEBL program it operates via manual responses using keyboard keys. Words are displayed sequentially on the computer screen, requiring participants to respond immediately. The participant's task was to name the colour (red, blue, green, or yellow) of the

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors
of Academic Achievement in Early Adolescence

25

word or symbol displayed, which could be congruent or incongruent with its meaning. There were three scenarios: neutral (control stimuli without a word, e.g. the symbol XXXX displayed in one of the four colours), congruent (the meaning matched the colour, e.g. the word green written in green colour), and incongruent (the colour differed from the meaning, e.g, the word green written in red colour). Each scenario included 48 trials. The variable of our interest was Stroop interference (i.e. Stroop effect), calculated as the discrepancy in average reaction time between incongruent and congruent trials. Lower interference values indicate higher levels of response inhibition (MacLeod, 1991).

The Backward Digit Span (BDS) is a widely used measure to assess working memory in individuals of various ages, including children, adolescents, and adults. It has been used in both clinical settings and research (Lezak et al., 2004; Poon, 2018). Participants in this computer-based task repeat a series of numbers in reverse order. For successful recall, individuals must suppress distractions, retain the number sequence in working memory, and input it backward (e.g. 3-7-6-9 becomes 9-6-7-3). Our participants began with a series of three numbers in a sequence. The number of displayed numbers increased when the participant successfully repeated at least one of two series of displayed numbers of equal length. The key variable of the task is the number of units correctly recalled in reverse order.

The Trail Making Test (TMT; Reitan, 1958; as cited in Arbuthnott & Frank, 2000) has two parts. Part A (TMT-A) measures psychomotor speed and visual attention. In its computer version, 25 circles are arranged on the screen, which participants connect sequentially using numbers (1-2-3-4). Part B (TMT-B) assesses executive function, specifically cognitive flexibility. The task is to alternately connect numbers (1 to 13) and letters (A to L) in the correct order (e.g. 1-A-2-B). Participants connect the circles in both parts by clicking on the subsequent number or letter with a computer mouse. The key variable of the task is the time it takes the participant to complete each subtest. A ratio score between Part B and Part A (TMT-B/TMT-A) has been shown the most appropriate measure of cognitive flexibility (Holfelder et al., 2020). A lower score indicates greater cognitive flexibility, whereas ratio scores of TMT-B/TMT-A > 3 indicate difficulties in cognitive switching (Arbuthnott & Frank, 2000).

Academic achievement. In the study, individual final grades in three main school subjects (i.e. Slovenian, mathematics, and a foreign language) were considered. In addition, overall academic achievement was calculated by averaging the adolescents' final grades in these subjects at the end of the current school year (T1) and one year later (T2). According to Slovenia's educational structure, student achievement is measured quantitatively from 1 (insufficient) to 5 (excellent). Data on the participants' academic achievement in this study were collected directly from their classroom teachers at T1 and T2.

2.3   Procedure

The Faculty of Arts Ethics Committee at the University of Ljubljana in Slovenia approved this study (approval no. 153-2019). Before the study, we linguistically adapted the PEBL program's measures. After obtaining informed parental consent and verbal consent from the adolescents, the assessment was conducted in a controlled environment, either in a classroom or the school counsellor's office. Each session lasted no more than 30 minutes. Prior to the assessment, the adolescents received clear verbal and on-screen instructions and completed trial runs. Classroom teachers provided the adolescents' final grades in Slovenian, mathematics, and foreign language at T1 and T2. The adolescents did not receive any financial or other compensation for their participation. On the contrary, classroom teachers received a certificate for their one-year participation. To ensure participant confidentiality, demographic data such as age, gender, school grades and assessments at T1 and T2 were stored using a unique research code system.

2.4   Statistical analyses

Data was analyzed using SPSS Statistics for Windows, Version 27.0. In the first step, we followed recommended methods for calculating Stroop interference and a TMT ratio score. Next, we performed descriptive statistics as well as Pearson correlations between variables, following Cohen's (1988) recommended thresholds of .10 (small), .30 (medium), and .50 (large). Series of multiple regression analyses using the Enter method included objective indicators of executive function as predictors and academic achievement (overall and subject-specific) at T1 and T2 as outcomes. Before regression analysis, data were tested for linearity, normal distribution, residuals' independence, homoscedasticity, non-multicollinearity, and absence of

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors of Academic Achievement in Early Adolescence

27

first-order autocorrelation (Field, 2013). The explanatory power of the model was categorized using Cohen's (1988) measures: small ($R^2 < 0.13$), medium ($R^2 = 0.13-0.25$), and large ($R^2 > 0.26$).

3   Results

Table 1: Descriptive statistics of executive function measures and academic achievement at T1 and T2

	N	*M*	*SD*	*Min*	*Max*	*Skewness*	*Kurtosis*
SCWT: INTF (incongruent−congruent)	134	119.23	87.69	−26.13	454.64	1.00	1.03
BDS: span score	137	4.76	1.23	2.00	8.00	0.04	−0.37
TMT ratio: TS-B/TS-A	137	1.68	0.57	0.66	4.07	1.52	3.23
Academic achievement – overall (T1)	137	3.90	0.88	1.67	5.00	−0.53	−0.68
Grade: Slovene	137	3.88	0.97	2.00	5.00	−0.44	−0.78
Grade: Mathematics	137	3.85	1.05	1.00	5.00	−0.42	−0.89
Grade: Foreign language	137	3.98	0.94	2.00	5.00	−0.54	−0.66
Academic achievement – overall (T2)	135	4.08	0.77	2.00	5.00	−0.58	−0.44
Grade: Slovene	135	4.09	0.90	2.00	5.00	−0.61	−0.59
Grade: Mathematics	135	4.00	1.00	2.00	5.00	−0.59	−0.81
Grade: Foreign language	135	4.16	0.85	2.00	5.00	−0.67	−0.41

Note. T1 = time 1. T2 = time 2 (one year later). SCWT = The Stroop Color-Word Task. INTF = interference (in milliseconds, two different conditions). BDS = The Backward Digit Span. TMT = The Trail Making Test (in seconds). TS-B/TS-A = ratio of time B to time A. Presented are final grades for each subject; overall academic achievement is the average of these grades.

Before analyses, the SCWT data were refined. We discarded response times below 200 ms and above 2000 ms, indicating anomalies (e.g. duplicate responses or external interference). We excluded data from three participants and retained accurate times within three standard deviations of each condition's average (Khng & Lee, 2014). Table 1 shows descriptive statistics for objective measures of executive function−

Stroop interference as an indicator of inhibition, working memory span, and ratio scores from the Trail-Making Test as an indicator of cognitive flexibility. The table also includes descriptive data on overall academic achievement and subject-specific grades at T1 and T2. There was a significant improvement in overall academic achievement from T1 to T2, $t(134) = -4.46$, $p < 0.001$.

Table 2 shows the correlations between measures of executive functions and indicators of academic achievement. All the statistically significant associations were modest in terms of effect size. Working memory span score correlated positively with overall achievement at T1 and T2 and with grades in Slovenian and mathematics but not in foreign language. A higher TMT ratio score, reflecting difficulties in cognitive flexibility, significantly correlated with lower grades, especially in mathematics. Stroop interference did not show any significant correlations with academic achievement.

Table 2: Correlation coefficients between executive function measures and indicators of academic performance at T1 and T2

	SCWT: INTF (incongruent−congruent)	BDS: span score	TMT ratio: TS-B/TS-A
Academic achievement – overall (T1)	−0.11	0.22*	−0.21*
Grade: Slovene	−0.09	0.22**	−0.12
Grade: Mathematics	−0.11	0.20*	−0.27**
Grade: Foreign language	−0.10	0.15	−0.15
Academic achievement – overall (T2)	−0.13	0.20*	−0.23**
Grade: Slovene	−0.07	0.15	−0.21*
Grade: Mathematics	−0.16	0.21*	−0.21*
Grade: Foreign language	−0.09	0.13	−0.16

Note. $N = 132$–134. T1 = time 1. T2 = time 2 (one year later). SCWT = The Stroop Color-Word Task. INTF = interference (in milliseconds, two different conditions). BDS = The Backward Digit Span. TMT = The Trail Making Test (in seconds). TS-B/TS-A = ratio of time B to time A. Pearson correlation coefficient, *$p < 0.05$; **$p < 0.01$.

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors of Academic Achievement in Early Adolescence

29

Table 3 presents the summary of the regression analyses highlighting the role of executive functions in overall academic achievement. The independent predictors included in regression models are based on significant correlations (displayed in Table 2). Working memory, represented by the Backward Digit Span, consistently and positively predicts academic achievement at both T1 and T2. Conversely, a higher TS-B/ TS-A ratio score, indicating difficulties with cognitive flexibility, significantly predicts lower academic achievement during the same period. According to the recommendation by Cohen (1988), the effect size within the two multiple regression models was small, explaining 8.4% and 8.8% of the variance in the students' overall achievement at T1 and T2, respectively.

Table 3: Results of a series of multiple regression analyses: objective executive functions as predictors of overall academic achievement at T1 and T2

Dependent variables	Independent variables	β [95% CI]	p	R^2
Academic achievement – overall (T1)	BDS: span score	0.21 [0.03, 0.26]	0.014	0.084
	TS-B/TS-A	–0.19 [–0.54, –0.04]	0.022	
Academic achievement – overall (T2)	BDS: span score	0.19 [0.01, 0.22]	0.026	0.088
	TS-B/TS-A	–0.22 [–0.51, –0.08]	0.009	

Note. BDS = The Backward Digit Span. TS-B/TS-A = ratio of time B to time A (TMT). CI = confidence intervals [lower, upper].

As shown in Table 4, comparable outcomes were found when predicting subject-specific grades, particularly in mathematics. The regression models included independent predictors derived from significant correlations (displayed in Table 2). Both working memory and cognitive flexibility emerged as predictors of higher mathematical achievement among early adolescents. These two executive functions accounted for somewhat more mathematical achievement variability (10.6%) in the current year than in the following year (8.3%).

Table 4: Results of a series of multiple regression analyses: objective executive functions as predictors of mathematical achievement at T1 and T2

Dependent variables	Independent variables	β [95% CI]	p	R^2
Grade: Mathematics (T1)	BDS: span score	0.18 [0.02, 0.30]	0.026	0.106
	TS-B/TS-A	−0.26 [−0.77, −0.18]	0.002	
Grade: Mathematics (T2)	BDS: span score	0.20 [0.03, 0.30]	0.017	0.083
	TS-B/TS-A	−0.20 [−0.62, −0.05]	0.021	

Note. BDS = The Backward Digit Span. TS-B/TS-A = ratio of time B to time A (TMT). CI = confidence intervals [lower, upper].

Based on the results of separate simple regressions, we found that greater working memory span predicted higher final grades in Slovenian language at T1 ($\beta = 0.22$, 95% CI [0.05, 0.31], $p = 0.009$, $R^2 = 0.050$), but not at T2. However, a higher level of cognitive flexibility, as indicated by a lower ratio score on the Trail Making Test, predicted higher final grades in Slovenian language at T2 ($\beta = –0.21$, 95% CI [–0.60, –0.07], $p = 0.013$, $R^2 = 0.046$).

4   Discussion

Our study examined the predictive relations between objective measures of executive functions and academic performance in a sample of Slovenian adolescents. We used standard measures of the Stroop Color-Word Test, the Backward Digit Span, and the Trail Making Test to assess inhibition, working memory and cognitive flexibility, respectively. Classroom teachers reported on adolescents' academic performance using final grades in three subjects: Slovenian, mathematics, and a foreign language.

Consistent with our expectations, higher scores in the Backward Digit Span task (indicating greater working memory capacity) were significantly associated with academic achievement at both T1 and T2. Conversely, a higher ratio score on the Trail Making Test (indicating difficulties with cognitive flexibility) was associated with poorer academic achievement. Adolescents with greater working memory

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors of Academic Achievement in Early Adolescence

31

capacity and cognitive flexibility are better equipped to process and retain information, to adapt to changing tasks, and to integrate various concepts or ideas. These abilities are evident in enhanced proficiency in executing academic tasks and faster acquisition of new knowledge. Although we obtained small effects on achievement indicators, our findings concur with the previously documented association between working memory capacity and academic achievement in children and adolescents (Ahmed et al., 2019; Blair & Razza, 2007). Specifically, from ages six to twelve, working memory was suggested to be a salient predictor (e.g. Cortés Pascual et al., 2019), even surpassing intelligence in predicting academic success (Alloway, 2009).

The objective measures of executive function under study differentially relate to specific school subjects. In our sample, working memory and cognitive flexibility were likely to enhance mathematical achievement. For achievement in Slovenian language, the results were less consistent. Specifically, greater working memory span predicted higher grades at T1, whereas a lower ratio score on the Trail Making Test was associated with better grades at T2. We conclude that advanced working memory and cognitive flexibility enable students to process information more efficiently, to adjust mathematical strategies to different types of problems, to analyze and interpret texts more in-depth, and to write complex essays. These cognitive skills are, in turn, reflected in their overall academic performance. Previous research has also highlighted the role of working memory in mathematical achievement and of cognitive flexibility in children and adolescents' reading comprehension (e.g. van der Sluis et al., 2007; Yeniad et al., 2013).

In contrast, our results indicated that none of the objective measures of inhibition, working memory, or cognitive flexibility predicted final grades in a foreign language at either T1 or T2. These findings were unexpected, as various aspects of executive functions play integral roles in language skills, encompassing both production and comprehension. Specifically, previous research suggests that shifting might relate to the ability to monitor conversations; working memory could be involved in updating and monitoring information for sentence production and comprehension, as well as organizing episodic content; and inhibitory control might be vital for suppressing semantic competitors during word production or comprehension (Miyake et al., 2000; Mozeiko et al., 2011). While evidence underscores the influence of executive functions, notably working memory and cognitive flexibility, on academic

achievement, their significance in foreign language grades might be marginal. This could be partly due to the Slovenian cultural context, where adolescents infrequently use foreign languages (e.g. English, or German), often constraining their use to specific school settings or informal peer-to-peer slang. A detailed assessment of linguistic aspects, including syntax, semantics, and pragmatics, would offer deeper insights into the relationship between executive functions and foreign language achievement (Shokrkon & Nicoladis, 2022).

The analysis of the relationship between Stroop interference and adolescents' academic outcomes revealed negative associations. Adolescents with longer reaction times, indicating increased interference, tended to achieve lower grades in Slovenian language, mathematics, foreign language, and overall. However, these associations were not statistically significant, which contradicts previous research highlighting the importance of self-control in academic achievements (Ahmad & Sultana, 2021; Duckworth et al., 2019). The divergence may be attributed to differences in calculating Stroop interference (for a review, see Scarpina & Tagini, 2017), limitations of this measure in assessing inhibition comprehensively, and potential challenges in capturing individual differences in cognitive abilities among early adolescents.

Our results highlight the importance of enhancing adolescents' executive skills to achieve better academic outcomes. Crucial interventions include working memory training (e.g. tasks that incrementally improve performance; Zelazo et al., 2016) and learning strategies for sorting and retention (e.g. mnemonics, acronyms, acrostics). Adolescents need to master task organization and prioritization, which can be accomplished with tools such as templates, mental models, or graphic organizers. Teachers can use problem-solving techniques to promote cognitive flexibility and incorporate diverse teaching methods (e.g. collaborative learning and peer discussions) to foster critical thinking (Meltzer, 2014).

Our research also emphasizes the need to explore cognitive predictors of academic achievement further. Consideration of final grades in different subjects would be beneficial, as each subject differs in content, teaching methods, and the required cognitive skills. We assume that increased cognitive flexibility facilitates successful understanding and application of complex concepts, particularly in science subjects (e.g. physics) and geography. Concerns about the objectivity of executive function

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors of Academic Achievement in Early Adolescence

33

measures can be addressed using multiple tasks to assess specific aspects of executive function and predict different academic outcomes. Future research should focus on the effectiveness of executive function strategies and their direct impact on academic success.

5   Conclusions

Our study highlights the critical role of executive functions, especially working memory and cognitive flexibility, in explaining academic achievement among Slovenian adolescents. Working memory and cognitive flexibility were robust predictors of their overall academic achievement. These executive skills enable students to process information efficiently, switch seamlessly between tasks, and assimilate different academic concepts, particularly in mathematics and Slovenian language. Results on foreign language performance were less conclusive, reflecting perhaps the complex nature of language learning in a specific cultural context and the need for a more accurate assessment of specific aspects of the language. The study also challenges previous assumptions about the Stroop interference measure and its relationship to academic achievement. Improving adolescents' executive skills, including their ability to adapt flexibly to different academic challenges, is critical for better academic outcomes. As we progress in understanding the cognitive predictors of academic achievement, it remains imperative to expand research on different school subjects and more sophisticated measures of executive functioning to optimize educational strategies for adolescents' academic success.

References

Ahmad, N. in Sultana, M. A. (2021). Effects of metacognitive ability and selective attention ability on academic performance of adolescents. *Dhaka University Journal of Biological Sciences, 30*(1), 59–67. https://doi.org/10.3329/dujbs.v30i1.51809

Ahmed, S. F., Tang, S., Waters, N. E., & Davis-Kean, P. (2019). Executive function and academic achievement: Longitudinal relations from early childhood to adolescence. *Journal of Educational Psychology, 111*(3), 446–458. https://doi.org/10.1037/edu0000296

Alloway, T. P. (2009). Working memory, but not IQ, predicts subsequent learning in children with learning difficulties. *European Journal of Psychological Assessment, 25*(2), 92–98. https://doi.org/10.1027/1015-5759.25.2.92

Anderson, V. A., Anderson, P., Northam, E., Jacobs, R., & Catroppa, C. (2001). Development of executive functions through late childhood and adolescence in an Australian sample. *Developmental Neuropsychology, 20*(1), 385–406. https://doi.org/10.1207/S15326942DN2001_5

Arbuthnott, K. in Frank, J. (2000). Trail Making Test, Part B as a measure of executive control: Validation using a set-switching paradigm. *Journal of Clinical and Experimental Neuropsychology, 22*(4), 518−528. https://doi.org/10.1076/1380-3395(200008)22:4;1-0;FT518

Best, J. R., & Miller, P. H. (2010). A developmental perspective on executive function. *Child Development, 81*(6), 1641–1660. https://doi.org/10.1111/j.1467-8624.2010.01499.x

Best, J. R., Miller, P. H., & Jones, L. L. (2009). Executive functions after age 5: Changes and correlates. *Developmental Review, 29*(3), 180–200. https://doi.org/10.1016/j.dr.2009.05.002

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development, 78*(2), 647–663. https://doi.org/10.1111/j.1467-8624.2007.01019.x

Blakemore, S.-J., Burnett, S., & Dahl, R. E. (2010). The role of puberty in the developing adolescent brain. *Human Brain Mapping, 31*(6), 926–933. https://doi.org/10.1002/hbm.21052

Buttelmann, F., & Karbach, J. (2017). Development and plasticity of cognitive flexibility in early and middle childhood. *Frontiers in Psychology, 8*, 1040. https://doi.org/10.3389/fpsyg.2017.01040

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates, Publishers.

Cortés Pascual, A., Moyano Muñoz, N., & Quílez Robres, A. (2019). The relationship between executive functions and academic performance in primary education: Review and meta-analysis. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.01582

Diamond, A. (2006). The early development of executive functions. In E. Bialystok, & F. I. M. Craik (Eds.), *Lifespan cognition: Mechanisms of change* (pp. 70–95). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195169539.003.0006

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135−168. https://doi.org/10.1146/annurev-psych-113011-143750

Duckworth, A. L., Taxer, J. L., Eskreis-Winkler, L., Galla, B. M., & Gross, J. J. (2019). Self-control and academic achievement. *Annual Review of Psychology, 70*, 373–399. https://doi.org/10.1146/annurev-psych-010418-103230

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

Fosco, W. D., Hawk, L. W., Jr., Colder, C. R., Meisel, S. N., & Lengua, L. J. (2019). The development of inhibitory control in adolescence and prospective relations with delinquency. *Journal of Adolescence, 76*, 37–47. https://doi.org/10.1016/j.adolescence.2019.08.008

Gathercole, S. E., Pickering, S. J., Knight, C., & Stegmann, Z. (2004). Working memory skills and educational attainment: Evidence from national curriculum assessments at 7 and 14 years of age. *Applied Cognitive Psychology, 18*(1), 1–16. https://doi.org/10.1002/acp.934

Goldstein, S., Naglieri, J. A., Princiotta, D., & Otero, T. M. (2014). Introduction: A history of executive functioning as a theoretical and clinical construct. In S. Goldstein & J. A. Naglieri, (Eds.), *Handbook of executive functioning* (pp. 3–12). Springer Science+Business Media. https://doi.org/10.1007/978-1-4614-8106-5

Gómez, C. M., Barriga-Paulino, C. I., Rodríguez-Martínez, E. I., Rojas-Benjumea, M. Á., Arjona, A., & Gómez-González, J. (2018). The neurophysiology of working memory development: from childhood to adolescence and young adulthood. *Reviews in the Neurosciences, 29*(3), 261–282. https://doi.org/10.1515/revneuro-2017-0073

Holfelder, B., Klotzbier, T. J., Eisele, M., & Schott, N. (2020). Hot and cool executive function in elite- and amateur- adolescent athletes from open and closed skills sports. *Frontiers in Psychology, 11*. https://doi.org/10.3389/fpsyg.2020.00694

Huizinga, M., & van der Molen, M. W. (2007). Age-group differences in set-switching and set-maintenance on the Wisconsin card sorting task. *Developmental Neuropsychology, 31*(2), 193–215. https://doi.org/10.1080/87565640701190817

E. Kranjec, M. Zupančič: Objective Measures of Executive Functions as Predictors of Academic Achievement in Early Adolescence

35

Huizinga, M., Baeyens, D, & Burack, J. A. (2018). Editorial: Executive function and education. *Frontiers in Psychology, 9*, 1–3. https://doi.org/10.3389/fpsyg.2018.01357

Khng, K. H. in Lee, K. (2014). The relationship between Stroop and stop-signal measures of inhibition in adolescents: Influences from variations in context and measure estimation. *PloS one, 9*(7), e101356. https://doi.org/10.1371/journal.pone.0101356

Koritnik, B., Kočevar, M., Knific, J., Tavčar, R., & Šprah, L. (2004). Prostorski in verbalni delovni spomin: študija s funkcijskim magnetnoresonančnim slikanjem [Spatial and verbal working memory: A functional magnetic resonance imaging study]. *Psihološka obzorja [Horizons of Psychology], 13*(2), 48−60.

Lezak, M. D., Howieson, D. B., & Loring, D. W. (2004). *Neuropsychological Assessment* (4th ed.). Oxford University Press.

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin, 109*(2), 163–203. https://doi.org/10.1037/0033-2909.109.2.163

McCloskey, G., Perkins, L. A., & Van Divner, B. (2009). *Assessment and intervention for executive function difficulties*. Routledge Taylor & Francis Group.

Meltzer, L. (2014). Teaching executive functioning process: Promoting metacognition, strategy use and effort. In S. Goldstein & J. A. Naglieri (Eds.), *Handbook of executive functioning* (pp. 445–473). Springer Science+Business Media. https://doi.org/10.1007/978-1-4614-8106-5

Miller, M., & Hinshaw, S. P. (2010). Does childhood executive function predict adolescent functional outcomes in girls with ADHD? *Journal of Abnormal Child Psychology, 38*(3), 315–326. https://doi.org/10.1007/s10802-009-9369-2

Mozeiko, J., Le, K., Coelho, C., Krueger, F., & Grafman, J. (2011). The relationship of story grammar and executive function following TBI. *Aphasiology, 25*(6-7), 826–835. https://doi.org/10.1080/02687038.2010.543983

Mueller, S. T. (2013). The Psychology Experiment Building Language (Version 0.13) [Computer software]. http://pebl.sourceforge.net

Nyongesa, M. K., Ssewanyana, D., Mutua, A. M., Chongwo, E., Scerif, G., Newton, C., & Abubakar, A. (2019). Assessing executive function in adolescence: A scoping review of existing measures and their psychometric robustness. *Frontiers in Psychology, 10*, 311. https://doi.org/10.3389/fpsyg.2019.00311

Poon K. (2018). Hot and cool executive functions in adolescence: Development and contributions to important developmental outcomes. *Frontiers in psychology, 8*, 2311. https://doi.org/10.3389/fpsyg.2017.02311

Scarpina, F., & Tagini, S. (2017). The Stroop Color and Word Test. *Frontiers in Psychology, 12*(8), 557. https://doi.org/10.3389/fpsyg.2017.00557

Shokrkon, A., & Nicoladis, E. (2022). The directionality of the relationship between executive functions and language skills: A literature review. *Frontiers in Psychology*, *13*, 1–15. https://doi.org/10.3389/fpsyg.2022.848696

St Clair-Thompson, H. L., & Gathercole, S. E. (2006). Executive functions and achievements in school: Shifting, updating, inhibition, and working memory. *Quarterly Journal of Experimental Psychology, 59*(4), 745–759. https://doi.org/10.1080/17470210500162854

van der Sluis, S., de Jong, P. F., & van der Leij, A. (2007). Executive functioning in children, and its relations with reasoning, reading, and arithmetic. *Intelligence, 35*(5), 427–449. https://doi.org/10.1016/j.intell.2006.09.001

Yeniad, N., Malda, M., Mesman, J., van IJzendoorn, M. H., & Pieper, S. (2013). Shifting ability predicts math and reading performance in children: A meta-analytical study. *Learning and Individual Differences, 23*, 1–9. https://doi.org/10.1016/j.lindif.2012.10.004

Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2016). *Executive Function: Implications for Education (NCER 2017-2000)*. National Center for Education Research, Institute of Education Sciences, U.S. Department of Education.

Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

Ondřej Koželuh, Eva Koželuhová, Milan Podpera
University of West Bohemia, Faculty of Education, Pilsen, Czech Republic
kozeluho@kpg.zcu.cz, kozeluhe@kpg.zcu.cz, mpodpera@kpg.zcu.cz

Model of the teacher as a reflective practitioner has come to the fore in recent years. The students are considered a key actor in their own professional development. The aim is to present a tool for students' reflection and self-reflection. The tool was created to individualize the training of future teachers. The tool was implemented within all pedagogical practices of students of early childhood education and verified through students' reflective reports (N=91) at the University of West Bohemia in Pilsen. The tool helps students think about their professional development, plan sub-steps and set specific goals they want to achieve in the development of their professional competences. Students also chose different goals for their development, which corresponded to their different initial knowledge and experience.

University of Maribor Press

ORODJE ZA SAMOREFLEKSIJO ZA VZGOJITELJE PREDŠOLSKE VZGOJE KOT POT DO KOMPETENTNEGA VZGOJITELJA

ONDŘEJ KOŽELUH, EVA KOŽELUHOVÁ, MILAN PODPERA
Univerza West Bohemia, Pedagoška fakulteta, Pilsen, Češka
kozeluho@kpg.zcu.cz, kozeluhe@kpg.zcu.cz, mpodpera@kpg.zcu.cz

V zadnjih letih je v ospredju model učitelja kot refleksivnega praktika. Učenci veljajo za ključne akterje lastnega profesionalnega razvoja. Namen prispevka je predstaviti orodje za refleksijo in samorefleksijo učencev. Orodje je bilo ustvarjeno z namenom individualizacije usposabljanja bodočih učiteljev. Orodje je bilo implementirano v vse pedagoške prakse študentov predšolske vzgoje in preverjeno z refleksivnimi poročili študentov (N=91) na Zahodnočeški univerzi v Plznu. Orodje pomaga študentom razmišljati o svojem poklicnem razvoju, načrtovati podetape in določiti konkretne cilje, ki jih želijo doseči pri razvoju svojih poklicnih kompetenc. Študenti so si izbrali tudi različne cilje svojega razvoja, ki so ustrezali njihovemu različnemu začetnemu znanju in izkušnjam.

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

39

1   Introduction

The work of a preschool teacher is beautiful, but also extremely demanding (Hall-Kenyon et al., 2014). An adult takes on a great responsibility and enters a child's life with the intention of significantly influencing him. The specifics of a teacher's work in preschool education result both from the developmental characteristics of the preschool period and from the diversity of children and families who come to kindergartens (Keenan et al., 2016). Kindergarten is often the first place where a child steps out of the family environment and gains further experience. He enters new social roles and must overcome many difficulties. Teachers must be prepared for their work so well that they can perceive the individual needs of each child, support them and create an environment in which the child will be well, and his potential can be developed. This is not an easy task for educators of future teachers, and therefore it is necessary to find ways to provide students and their accompanying teachers with support in their professional development (Ribaeus & Hultman, 2022). Therefore, we aimed for verifying reflective tool's functionality enabling students to personalize future teachers' training and assessing how it aids their professional growth.

2   Teacher as a Reflective Practitioner

2.1   Professional Competence and Professional Development

Defining the term competence involves several aspects such as knowledge, skills, experiences, attitudes, values, personality characteristics or dispositions. Despite the formulation differences of the individual authors, there is the same line of understanding of the terms including the professional competence of the teacher. We can understand professional competence as the comprehensive qualities of a teacher needed to realize the profession (Peklaj, 2015; Vašutová, 2004). "Competences are a construct that characterizes the effective behavior of a teacher in individual layers of his activity and in individual pedagogical roles" (Vašutová, 2004, p. 92).

The development of professional competences of teachers or student teachers is a complex process influenced by various factors. Beauchamp (2015) emphasize the importance of reflection, self-evaluation and evaluation tools in this process. Both

Anspal et al. (2012) and Timoštšuk & Ugaste (2010) point to the importance of the practice period and social aspects of learning in the formation of teacher identity. Koster et al. (2008) draw attention to the importance of applying a professional standard and standard-based self-assessment and professional development procedures. These studies suggest that student teachers also have an active role in their own professional development, which is shaped by their experiences, interactions and learning processes. The student is considered a key actor in his own professional development (Collin et al., 2013; Jay & Johnson, 2002; Korthagen, 2011; Walkington, 2005; Walsh & Mann, 2015; Zeichner, 2004). It is the students who gradually develop their reflective skills, thanks to which they can constantly work on their professional development, learn new things and adapt to changing conditions even after completing their studies.

2.2   The Importance of Self-reflection in the Teaching Profession

In recent decades, the model of the teacher as a reflective practitioner has come to the fore when considering the concept of teacher preparation (Collin et al., 2013; Jay & Johnson, 2002; Korthagen, 2011; Walkington, 2005; Zeichner, 1994). In practice, this means that emphasis is placed on the ability to "see" and understand one's own actions or behavior in a situational context. For this, the teacher uses reflection and self-reflection. To reflect means to mirror. Reflection is "awareness of one's situation and position in confrontation with how others see us; in other words, it is the ability to adequately and critically understand what is happening in our world and to us in it", while self-reflection is "a certain internal dialogue, it is actually the answers to the questions we ask ourselves in connection with our activities" (Píšová & Černá, 2006, p. 14). We lean towards the concept of reflection according to Dewey (Korthagen, 2011), when practical experience relates to theoretical knowledge. In this process, there is a significant role of the accompanying teacher or educator, who helps the student to see and realize the key aspects of actions or behavior (Figure 1).

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education
Teachers as a Way to a Competent Teacher

41
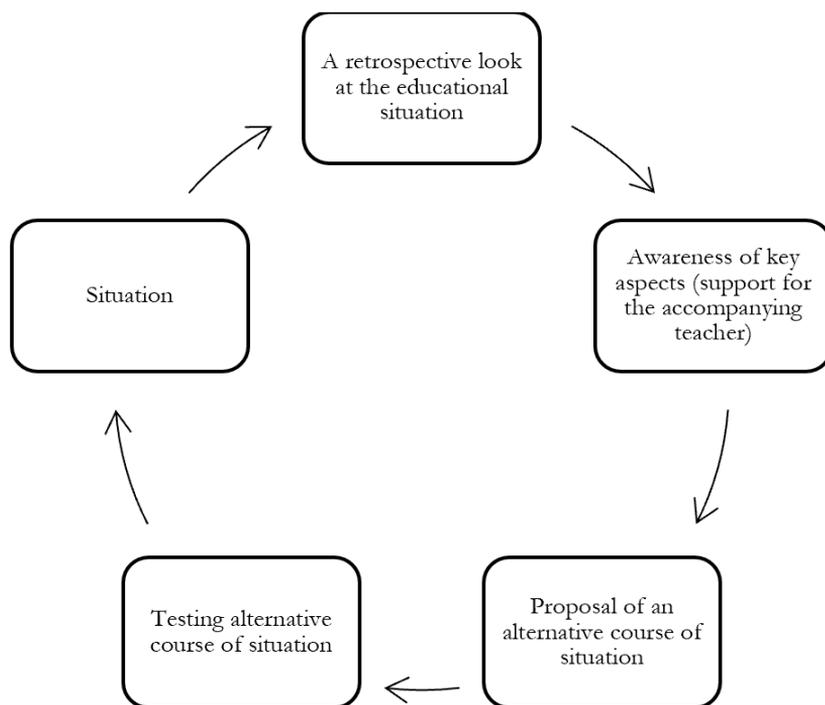
Figure 1: Model of reflection process.
Source: Korthagen, 2011, p. 58 modified

Research on the self-assessment of student teachers' professional competences reveals several key findings. Kalke et al. (2022) found that nursery school teaching students highly rate their competences in the area of ensuring professional activity, implementing the learning process and improving professional competences. Schneider & Bodensohn (2019) further emphasized the importance of assessment competences, with student teachers perceiving them as a distinct and important aspect of their professional development. However, Wheeler & Knoop (1982) pointed out that the self-evaluations of student teachers tend to be higher than the self-evaluations of their supervisors, which indicates a possible bias. It is therefore important to develop students' reflective skills. Pravdová (2015) points to possible or desirable interventions by educators of future teachers, which can be used to support the process within undergraduate training. Also, in other literature (Tomková et al., 2012; Tomková, 2014; Kratochvílová & Horká, 2016) we can come across tools to support or evaluate the professional development of future teachers.

The student is seen as a key actor in his own professional development (Vermunt & Verloop, 1999). It is him who gradually develops his reflective skills, which enables him to continuously work on his professional development, learn new things and adapt to changing conditions even after graduation. Studies (Kratochvílová & Horká, 2016; Vaculík Pravdová et al.) confirm the need to guide students and their educators to understand the importance of reflection. Burkovičová (2012) sees reflection on one's own teaching experience as one of the means of developing professional competences of preschool teachers. Syslová & Hornáčková (2014) see reflection as continuous professional learning that begins in pre-service education. They consider the achievement of metacognition in reflection as one of the criteria of teacher quality.

2.3   Self-reflective Tool for Preschool Teachers

The tool for students' reflection and self-reflection was created due to the need to individualize the training of future teachers and provide each student, at any stage of professional development, with adequate support. We based our experience on the fact that the entry level of knowledge, skills, but also the expectations and ideas about the teaching profession differ greatly among individual students. Individualization and differentiation of their professional development during their studies is thus a very necessary approach. This approach is also needed in the context of the issue of academic failure (Kubíková et al., 2021). We can talk about the individualization of the student's professional development as one of the fundamental ways to overcome this failure. During the creation, we were based on the phases of the teacher's professional development (Svatoš, 2013), while we focused on the area of motivation, shaping the idea of the social-personal role of the teacher and the didactic and reflective role. We were also inspired by foreign experiences with the preparation of future teachers, which build on the successive gradation of the difficulty of pedagogical practices, strengthening the importance of the accompanying teacher and structured self-reflection (Kosová, 2016). It is the structure of self-reflection that is a characteristic feature of the designed tool for reflection and self-reflection, as the student progresses from simpler (easier to achieve) professional development goals to more demanding and complex goals.

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

43

The process of creating a tool for student reflection and self-reflection took place in several stages. First, there were discussions about students' needs and existing tools for teacher quality assessment. The key areas of development of professional competences of students - future teachers were defined in accordance with the requirements of individual pedagogical practices. Subsequently, the first form of the tool for reflection and self-reflection was designed. The creation was based on the profile of a graduate of the Teaching for Kindergarten study program and the goals and content of individual pedagogical practices. It was inspired by some current tools for evaluating the work of a teacher in preschool education. The first of them was the Competent Teacher for the 21st Century (Step by Step, o.p.s. ČR (2011)), supplemented by the Tool for Evaluating the Quality of the Work of Preschool Teachers (Škardová, 2015). The second is the Framework of Professional Qualities of Kindergarten Teachers (Syslová & Škarková, 2015). All these materials contain an overview of individual professional competences, which, however, we needed to define in more detail for the needs of gradation of competence development. Another inspiration was the material Cards for Formative Assessment of Student Teachers (Vaculík Pravdová et al.), which is interesting in terms of format and the way it can be worked with. The new tool therefore contains detailed professional competences, graded from the easiest to the most demanding, divided according to the individual areas of teachers' professional activities (see Table 1.). The experience of the authors is especially valuable, that it is more meaningful for students to have a tool in a form where they can use it according to their needs, which classic evaluation sheets do not allow. In the phase of the first draft, the principals of kindergartens, who cooperate with the Faculty of Education in providing pedagogical practices, were invited to discuss the form and content of the tool. At the end of the term, a seminar was held for the accompanying teachers, where they had the opportunity to try out the tool and learn how to use it to support students in their pedagogical practices. In autumn 2022, the first phase of verification took place. All students of the second and third year of the study program Teaching for Kindergarten participated in it, in both full-time and combined forms. These students started to work with the tool, with the support of pedagogical practice teachers and accompanying teachers. In the same way, simultaneous verification was carried out within the pedagogical practices of the same field at the Faculty of Pedagogy of the Charles University. At the end of the term, students reflected on their experiences in the final colloquia. Accompanying teachers shared their experiences through a questionnaire survey. Based on the results, the tool was

modified. In the spring of 2023, the second phase of verification followed, which proceeded in the same way as the previous phase. The exception was the new use of the tool in student portfolios submitted as part of the state final exam. The results led to further modification of the instrument (Table 1).

Table 1: Description of monitored areas of the self-reflective tool.

Monitored area	Description
Me as a teacher - my professional development	Defining and clarifying the idea of yourself as a teacher. Searching for professional paths growth.
Communication with children	Interaction with children, applying a respectful and partnership approach.
Classroom management - taking care of the classroom climate	Class management and management of related tasks, including documentation. Development of support for prosocial relationships, creating an emotionally safe environment for every child.
Pedagogical diagnostics, assessment and the child's self-evaluation	Getting to know children and understanding their individual needs, developmental peculiarities and interests. Supporting the development of a child's self-concept.
Planning and implementation of education	Knowledge and application of appropriate educational methods and organizational forms with an emphasis on active participation of the child.
Planning and working with goals	Thoughtfulness in pedagogical design with an emphasis on the development of key competences and applying an integrative approach.
Planning and individualization	Applying an individualized approach to the planning and implementation of educational activities.
Communication with adult actors of education	Applying a partnership approach to colleagues and parents of children.
Preparing a supportive environment for child's learning	Setting material conditions to ensure children's well-being and optimize the learning process.

2.4   How to Work with the Tool

The tool is in the form of cards (see Figure 2), while each card contains one professional goal, or an aspect of the teacher's professional competence. The cards are color-coded and divided into individual areas (Table 1).

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

45

3.1	3.2	3.3
I help children resolve conflicts, teach them how to manage and prevent conflict situations.	I include games and activities for the development of social relationships	I approach the children fairly, I don't differentiate between them. At the same time, I respect their different dispositions, abilities and interests, and I provide each one with the support he or she needs.
3.4	3.5	3.6
I approach children without prejudice and stereotypes (gender, race, culture, etc.)	I am able to ensure the safety of the children while in and out of the classroom.	I am a role model for children in speech and action, I follow what I ask of them, I am authentic

Figure 2: An example of the gradation of the difficulty of competences in the selected area.
Source: Koželuhová et al. (2023)

When choosing career goals, a student should proceed by progressing from the basic level up in each area. He is always looking for evidence that he has already achieved the given goal. Evidence, in the form of e.g. a comment, a specific statement, a sample of pedagogical preparation, a photograph, etc., is added to the professional portfolio together with the given card. Thanks to this procedure, he can identify the level of his current development of professional competences related to the given area and plan what he will continue to work on in his professional development. This process takes place in a spiral manner, but the student is not expected to reach the maximum level in all the monitored areas during the course of study. The goal is to learn to reflect on the level of his professional development, to actively look for ways to grow and to connect practical experience with theoretical knowledge. The tool enables a shift within the individual capabilities of the student and the achievement of his maximum personal potential during his studies. It is assumed that the student will learn to work with the tool in such a way that he will be able to use it even after entering practice.

3 Research Aims

The goal of the research was to verify the functionality of the reflective tool for students to individualize the training of future teachers and to find out how the self-reflective tool helps students in their professional development.

3.1 Research Questions

Following research questions were formulated:

RQ1: What is the reason for students to choose a concrete goal for their practice?

RQ2: What is the opinion of students about the self-reflective tool?

RQ3: What impact for their future study process has using of the self-reflective tool?

3.2 Participants

The research was conducted among all students of all years of full-time study of the study program Teaching for Kindergarten (N=91) in the academic year 2022/2023 and was implemented in the form of a multi-case study of the evaluation type (Yin, 2018), where a case was understood as one study year (Tab. 2). The research was carried out in accordance with the Code of Ethics of the University of West Bohemia in Pilsen (2022). Part-time students who were already teaching in ECE facilities were excluded from the research, because their vast experience with teaching would alter the results.

Table 2: Description of participants

	Year of study	Sum
A	1	21
B	2	18
C	3	52
Total		91

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

47

3.3 Data Collection and Analysis

Data were collected from students' anonymous reflective reports (N=91) in June 2023, which they submitted together with their portfolio documenting their study progress. Data were analyzed using open coding, when individual student statements were divided into data segments that were assigned individual codes. These were subsequently grouped into clusters; into categories that were analysed by thematic coding in line with the research questions (Miles et al., 2014; Yin, 2018) (Table 3). Coding was done using Atlas.ti software.

Table 3: Analytical categories induced in qualitative analysis.

Category	Description
Choice of professional goal	Approach to choosing the career goal the student wants to work on; motives, reasons
Benefit of the tool	Students' views on the benefits of the tool for improving their professional development
Impact of the tool on students' professional development	Evaluating the impact on students' professional development

4 Results

4.1 What is the Reason for Students to Choose a Concrete Goal for Their Practice?

Students of all three groups give similar reasons when choosing their own educational goal, the achievement of which they want to focus immediately, which can be divided into two main categories:

The student´s need - In terms of frequency of codes, this category was the most represented across all monitored years. This category includes statements expressing the reason for choosing a specific goal/card associated with the student's internal motivation. The statements were typically presented with the phrase "I want". In these cases, students perceived their needs, named them, and were able to plan steps that helped them achieve their goals. We have identified three levels of intrinsic motivation in this category of statements - *the need to learn something new, the need to overcome one's own deficiency and the need to satisfy curiosity.* The need to learn is represented, for example, by the statement: "When choosing cards, I choose the ones that will

take me further, I have things on them that I want to master." Another represented level related to the student's internal needs was the need to overcome one's own shortcomings associated with the perception of one's own weakness; it is represented, for example, by the statements "I chose such cards, because I felt these were areas I needed to work on."; or "I choose according to what I feel insecure about", "I focus on goals that I have a problem with". The above statements indicate that students who make their choice for reasons in the form of a desire to improve, understand the nature of a self-reflective tool and are able to reflect on their professional growth. One third-year student expressed it succinctly with the words: "I take mastering the card as my personal challenge", which means a purposeful approach to professional development. This may not be the case for students who, although they also chose their goals based on their need, it was a need to satisfy their curiosity. Statements such as "this card was chosen out of curiosity, I wanted to get to know something new", or "I found it interesting" do not directly imply awareness of the need to master a certain competence.

Experience from previous practice - The second identified category is related to both the student's internal and external motivation and occurred only in second and higher year students. The choice was the result of their previous experience in teaching practice. The students either responded to some perceived deficiency, e.g. "At the previous practice, I had the feeling that my activities did not make much sense, they were not connected in any way and it was a bit of chaos, that's why I chose this card.", or "I chose this card for a clear reason - I never thought about the risks in advance. I think it has a bit to do with my nature. I'm quite impulsive and sometimes act without thinking." Sometimes students listened to the recommendations of the practice mentor in their selection, who told them what to work on next ("I always choose cards according to the mentor's evaluation from the last practice."). In the second case, however, the question is whether they internally identified with the mentioned recommendation and therefore perceived the need to work on something, or whether they took it as an instruction, a task that they are only fulfilling.

The need of the situation - There were rare statements indicating that the selection of the card was made as a reaction to the current situation in the classroom, when the student was confronted with the need to handle a certain situation in practice. An example is the statement: "There were a large number of children in the class

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

49

who were in kindergarten for the first time, so I chose cards that were primarily focused on communicating with them."

The reasons for choosing a specific goal reflect an understanding of the meaning of the self-reflective tool and an awareness of one's own responsibility for one's professional development; it is also related to the answer to another research question.

4.2   What is the Opinion of Students about the Self-reflective Tool?

The tool for student self-reflection is mostly very positively received. A first-year student stated: "I see as very positive how we are led to constantly clarify our own relationship to individual aspects of the teacher's work, as well as to the profession itself". Both its content and formal processing are appreciated, which students enables easy orientation. There were opinions among the students that the tool is suitable "even for experienced teachers who would like to further develop and work on themselves". The stated advantages can be divided into three categories:

A tool as a mirror - The tool helps the student evaluate the level of his development so far, helps him in self-reflection and planning the next steps in education. This is expressed, for example, in the statement: "they help to discover one's strengths or, conversely, one's weaknesses". This category was the most represented in terms of frequency of codes.

A tool as a direction indicator - "While using the cards, one realizes what still needs to be worked on" or "they show me the areas that I need to be able to do as a teacher". Thanks to the tool, students know where to head in their professional growth, what they should master, they can form a concrete idea of the complexity of the teaching profession. Both mentioned categories confirm the functionality of the tool and its contribution to the preparation of future teachers.

However, there were also categories that indicate a lack of understanding of the purpose of the tool and therefore represent a stimulus for possible improvement of the use of the tool not only during practice, but also during teaching. These are the following categories:

A tool as an inspiration - In this case, the tool is used as a topic for possible activities with children, e.g., the inclusion of self-assessment activities, cooperative activities or the involvement of children in planning, which are perceived by the student as possible, but not necessary for the quality of his pedagogical work. This code indicates that the tool was not fully understood; the contained competences are not understood as binding.

A tool as a duty - In the reflections, sporadically, but nevertheless, statements appeared that lead us to believe that the purpose of the tool was not understood. It is perceived as another study obligation, as was expressed, for example, by the statement "It's another obligation that I have to fulfill at the practices". The impression of the obligation "I have to fulfill some card" results in the student focusing more on formal fulfillment during teaching practice, rather than on a comprehensive perception of his pedagogical activity and level of development. In this way, there is no self-reflection of one's pedagogical work or professional growth, reflection on strengths and weaknesses, opportunities for self-development. we perceive as important the fact that the statements fell into this category only among third-year students, who first encountered the tool almost at the end of their practice. In the lower grades, the statement referring to the perception of the instrument as another study obligation did not occur.

A tool as a source of concern - Some students made statements, although often associated with a generally positive evaluation of the tool, that show that the tool can lead to student discomfort. "Although they help me to focus on the given things, at the same time it makes me depressed, how much I still have to improve", summed up one student. Others cited as problematic the number of cards-goals from which students choose. Their high number makes orientation and selection difficult; it can evoke the idea of the unattainability of individual goals and thereby influence the aspirational level of students.

4.3   What Impact for Students´ Future Study Process Has Using of the Self-reflective Tool?

The tool is evaluated by the students as beneficial; they stated the specific effects of its use on their professional development and mastery of pedagogical practice. The following main positives emerged from the respondents' answers:

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education
Teachers as a Way to a Competent Teacher

51

Perception of own progress - The tool allows students to recognize and name the sub-achievements they are achieving. In practice, many monitored competences may not be clearly perceived by the student, the student may not be aware of any of his skills, or vice versa. The evaluation of one's own pedagogical output is often influenced by current emotions. However, the tool provides a clear evaluation criterion that helps students to view their work objectively: it expresses, for example, the statements: "thanks to it, I will make sure whether I managed to incorporate and develop my other teaching competences", or the given specific description of the change in status: "at first the competence was more difficult to describe, but by the end I could see it almost immediately".

Thinking about one's own professional development, planning next steps - Students report that thanks to the tool they think much more about themselves, about their idea of an ideal teacher, about what is needed in practice: "I realize how and what a good teacher must be able to do. What I have to work on."

Implementation of pedagogical practice with professional development goals - Pedagogical practices as a result of using the tool are much more targeted, the student systematically prepares for them. It is no longer only about "participation" in pedagogical practice, but about the deliberate implementation of concrete steps that are intended to advance the student. It was curiously summed up by a third-year student who stated that "finally, I have another goal in my practice than to survive".

Looking for evidence of self-improvement - Thanks to the tool, students don't just stick with their assumption that they already master a skill. They are looking for evidence. We found these in their reflections in the form of a specific description of fulfilling the goal of the selected card, for example: "In my preparations, I always wrote down what risks might occur, I thought about how to behave in situations". In one reflection there was even an appeal, so that students don't put the cards away with the feeling of "I've done it, I'm putting the card on the pile", but keep coming back to them in their practice.

5   Discussion, Conclusion and Limitations

The results of the survey showed that the tool for self-reflection is functional and necessary. The tool respects individual study needs and interests of the students, when it gives them a choice and leads them to responsibility, what they will currently focus on in their professional development. Thanks to this, students feel more responsible for their own professional development (Vermunt & Verloop, 1999). They think about themselves, about their future profession as a teacher, perceive their strengths and the areas they want/need to work on. This is consistent with the idea of the teacher as a reflective practitioner who uses self-reflection in his daily work (Korthagen, 2011; Walkington, 2005; Zeichner, 1994; Jay & Johnson, 2002).

However, the results showed the necessity of quality student support. It is not possible to leave them to themselves with only a self-reflective tool, but it is necessary to guide them through the process of learning self-reflection, which is confirmed by findings (Pravdová, 2015; Wheeler & Knoop, 1982). Otherwise, there is a risk of formal use of the tool. It is necessary to actively teach the students and the mentors to systematically reflect their own work. Without their support, it is difficult for some students to use the tool independently, as they are not yet able to sufficiently reflect on their work and use the tool as a springboard for the next step. Instead, they perceive it as one of many duties, its meaning remains hidden from them, or they cannot apply it independently. On the other hand, if students are familiar with the tool from the beginning of their studies, it is easier for them to accept it and base their professional development on it. The demands placed on students by individual required competences through partial professional goals/cards can positively influence their aspirational level and thereby strengthen the chance that they will successfully complete their studies (Kubíková et al., 2021). This may be related to the fact that they experience satisfaction from what they have mastered, and their professional and personal self-confidence grows (Kalke et al., 2022).

The tool brings opportunity for students and their mentors to discuss and cooperate on students´ professional development. The joint search for evidence of the application of the given competence can significantly strengthen the objectivity of the student's self-assessment. This is important for overcoming a different view of

O. Koželuh, E. Koželuhová, M. Podpera: Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher

53

the achieved level of students' professional competences (Schneider & Bodensohn, 2019).

Several students evaluated the tool through the lens of a teacher, not a student, and spoke of its importance to the wider educational community. "I think that every teacher should get cards. Both for the beginning and also during the years when he works as a teacher, so he can check that he doesn't forget anything." In the Czech Republic, compulsory competency frameworks for teachers are now being prepared, which follow on from the general competency framework for a teacher graduate (MŠMT, 2023). The created tool could become one of the starting points for formulating the competences of preschool teachers.

Limitations of the research are that the students might have been possibly directly influenced by the researchers. Another limitation is a number of students involved. For more complex view we would need more participants during more academic years. Final limitation is that the researchers are also authors of the tool, which could have created some bias.

For further research we suggest implementation of the tool on other universities and researching the outcomes. If the results of such researches would prove beneficial for the students and the overall system, implementation of the tool on national level would seem appropriate.

References

Anspal, T., Eisenschmidt, E., & Löfström, E. (2012). Finding myself as a teacher: exploring the shaping of teacher identities through student teachers' narratives. *Teachers and Teaching, 18*, 197 - 216. doi.org/10.1080/13540602.2012.632268

Beauchamp, C. (2015). Reflection in teacher education: issues emerging from a review of current literature. *Reflective practice*, 16(1), 123-141. https://doi.org/10.1080/14623943.2014.982525

Burkovičová, R. (2012). Reflektivní pedagogická praxe jako prostředek vytváření kompetencí budoucího učitele MŠ [Reflective pedagogical practice as a means of creating the competences of future kindergarten teachers]. In *Komplexnosť a integrita v predprimárnej,*

primárnej a špeciálnej edukácii [Complexity and integrity in pre-primary, primary and special education] (s. 48–53). Prešovská univerzita v Prešove.

Collin, S., Karsenti, T., & Komis, V. (2013). Reflective practice in initial teacher training: Critiques and perspectives. *Reflective practice*, *14*(1), 104-117. doi.org/10.1080/14623943.2012.732935

Hall-Kenyon, K. M., Bullough, R. V., MacKay, K. L., & Marshall, E. E. (2014). Preschool teacher well-being: A review of the literature. Early Childhood Education Journal, *42*(3), 153-162.

Jay, J. K., & Johnson, K. L. (2002). Capturing complexity: A typology of reflective practice for teacher education. *Teaching and teacher education, 18*(1), 73-85. doi.org/10.1016/S0742-051X(01)00051-8

Kalke, B., Baranova, S., & Āboltiņa, L. (2022). Self-Assessment of the Professional Competence of Preschool Teaching Student. *Acta Paedagogica Vilnensia. 48*, 116-128. doi.org/10.15388/ActPaed.2022.48.7

Keenan, C., Connolly, P., & Stevenson, C. (2016). Universal preschool-and school-based education programmes for reducing ethnic prejudice and promoting respect for diversity among children aged 3-11: A systematic review and meta-analysis.

Korthagen, F. A. J. (2011). *Jak spojit praxi s teorií: didaktika realistického vzdělávání učitelů* [How to combine practice with theory: didactics of realistic teacher education]. Paido.

Kosová, B. (2016). *Profesijná príprava budúcich učiteľov a cvičný učiteľ vo svetle medzinárodných trendov* [Professional training of future teachers and teacher trainees in the light of international trends]. In: Švec, V., Lojdová, K. a Pravdová, B. Učitelské praxe – současné poznatky a perspektivy [Teaching practice - current findings and perspectives]. Masarykova univerzita.

Koster, B., Dengerink, J., Korthagen, F.A., & Lunenberg, M. (2008). Teacher educators working on their own professional development: goals, activities and outcomes of a project for the professional development of teacher educators. *Teachers and Teaching*, *14*, 567 - 587. doi.org/10.1080/13540600802571411

Koželuhová, E., Podpera, M., & Koželuh, O. (2023). *Na cestě ke kompetentnímu učiteli* [On the Way to a Competent Teacher].

Kratochvílová, J., & Horká, H. (2016). Autonomní a heteronomní hodnocení jako jedna z determinant účinnosti učitelských praxí [Autonomous and heteronomous evaluation as one of the determinants of the effectiveness of teaching practices]. *Pedagogická orientace*, *26*, 272-298. doi.org/10.5817/PedOr2016-2-272

Kubíková, K., Boháčová, A., Pavelková, I., & Štech, S. (2021). *Příčiny (ne)úspěchu na vysoké škole* [Reasons for (failure) success at university]. Grada.

MŠMT. 2023. *Kompetenční rámec absolventa a absolventky učitelství* [Competence Framework for Graduate Teachers]. Praha: MŠMT.

Peklaj, C. (2015). Teacher competencies through the prism of educational research. Center for Educational Policy Studies Journal, *5*(3), 183-204.

Píšová M., & Černá M. (2006). *Pro mentory projektu KLINICKÝ rok. Vedení pedagogické praxe* [For mentors of the CLINICAL year project. Management of pedagogical practice]. Univerzita Pardubice.

Pravdová, B. (2015). *Já jako učitel: profesní sebepojetí studenta učitelství* [Me as a teacher: the professional self-concept of a student teacher]. Masarykova univerzita.

Ribaeus, K., & Hultman, A. L. (2022). Teacher educators' perspectives on shaping a preschool teacher education while dealing with internal and external demands. Journal of Praxis in Higher Education, 4(1), 79-99.

Schneider, C., & Bodensohn, R. (2019). Student teachers' appraisal of the importance of assessment in teacher education and self-reports on the development of assessment competence In *Developing Teacher´s Assessment Capacity*. 7-26. Routledge.

Step by Step, o.p.s. ČR. (2011). *Kompetentní učitel 21. století: Mezinárodní profesní rámec kvality ISSA* [The Competent Teacher of the 21st Century: The ISSA International Professional Quality Framework]. Available from:

O. Koželuh, E. Koželuhová, M. Podpera: *Self-reflective Tool for Early Childhood Education Teachers as a Way to a Competent Teacher*

55

https://www.issa.nl/sites/default/files/pdf/Publications/quality/Quality-Principles-final-WEB.pdf

Svatoš, T. (2013). Student na cestě k učitelství – inspirace z výzkumné praxe [A student on the way to becoming a teacher - inspiration from research practice]. *Pedagogická orientace, 23*(6), 786–809.

Syslová, Z., & Hornáčková, V. (2014). Kvalita reflexe v profesním myšlení učitelek mateřských škol [The quality of reflection in the professional thinking of kindergarten teachers]. *Pedagogická orientace, 24*, 535-561. doi.org/10.5817/PedOr2014-4-535

Syslová, Z., & Škarková, L. (2015). Rámec profesních kvalit učitele mateřské školy [Framework of professional qualities of a kindergarten teacher]. Masarykova univerzita.

Šejnohová, K. (2023). Třicet let profesního rozvoje učitelů v České republice [Thirty years of professional development of teachers in the Czech Republic]. *Pedagogika. 73*(1). doi.org/10.14712/23362189.2022.2203

Škardová, M. (2015). *Nástroj pro hodnocení kvality práce učitele předškolního vzdělávání* [A tool for evaluating the quality of work of preschool teachers]. Step by Step, o.p.s. ČR.

Švaříček, R., & Šeďová, K. (2014). *Kvalitativní výzkum v pedagogických vědách* [Qualitative research in pedagogical sciences]. Portál.

Švec, V. (2004). *Pedagogické znalosti učitele: teorie a praxe* [Pedagogical knowledge of the teacher: theory and practice]. ASPI.

Timoštšuk, I., & Ugaste, A. (2010). Student teachers' professional identity. *Teaching and Teacher Education, 26*, 1563-1570. doi.org/10.1016/j.tate.2010.06.008

Tomkova, A. (2014). Preparation of reflective teachers (analyses of the final reflective and self-reflective tasks written by students of teaching profession). *Studia Edukacyjne, 31*, 323-338. 10.14746/se.2014.31.18

Tomková, A., Spilková, V., Píšová, M., Mazáčová, N., Krčmářová, T., Kostková, K., & Kargerová, J. (2012). *Rámec profesních kvalit učitele. Hodnoticí a sebehodnoticí arch* [Framework of teacher professional qualities. Evaluation and self-evaluation sheet]. Available from: https://www.nuov.cz/uploads/AE/evaluacni_nastroje/08_Ramec_profesnich_kvalit_ucitele.pdf

Vaculík Pravdová, B., a kol. *Kartičky pro formativní hodnocení studenta učitelství* [Formative assessment cards for student teachers]. Available from: https://www.ucitelnazivo.cz/karticky-pro-formativni-hodnoceni

Walsh, S., & Mann, S. (2015). Doing reflective practice: A data-led way forward. *Elt Journal, 69*(4), 351-362.

Vašutová, J. (2004). *Profese učitele v českém vzdělávacím kontextu* [The teaching profession in the Czech educational context]. Paido.

Vermunt, J. D., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction, 9*(3), 274–280. doi.org/10.1016/S0959-4752(98)00028-0

Walkington, J. (2005). Becoming a teacher: Encouraging development of teacher identity through reflective practice. *Asia-Pacific Journal of teacher education, 33*(1), 53-64. doi.org/10.1080/1359866052000341124

Wheeler, A., & Knoop, H.R. (1982). Self, Teacher, and Faculty Assessments of Student Teaching Performance. *Journal of Educational Research, 75*, 178-181. doi.org/10.1080/00220671.1982.10885377

Yin, R. K. (2018). *Case study research and applications*. SAGE Publications, Inc.

Západočeská univerzita v Plzni. (2022). *Etický kodex Západočeské univerzity v Plzni* [Code of Ethics of the University of West Bohemia in Pilsen]. Available from: https://www.zcu.cz/rest/cmis/document/workspace:/SpacesStore/543b1541-3680-4e66-ad5e-a0db59174299;1.1/content

Zeichner, K. M. (1994). Research on teacher thinking and different views of reflective practice in teaching and teacher education. *Teachers' minds and actions: Research on teachers' thinking and practice,* 9-27.

Supporting Teachers of Pre-primary Education to Develop Children's Thinking

Eva Koželuhová, Barbora Loudová Stralczynská
Charles University, Faculty od Education, Prague, Czech Republic
eva.kozeluhova@pedf.cuni.cz, barbora.loudova@pedf.cuni.cz

The aim of the paper is to present innovative teaching approaches to theoretical and practical modules, which were designed to support students of the pre-school education study programme in the field of communication and critical thinking development. Data were collected through content analysis of student seminar papers (N=185) and from student reflective reports (N=185). Data were analysed using open and thematic coding. The results indicated that students who had the opportunity to study in an integrated course with the use of supportive materials achieved better results in all monitored categories than students studying according to the original study plan. This comparison highlights the importance of an integrated approach to the preparation of future teachers, where they gain a holistic view of the studied issue within the framework of large teaching modules.

PODPORA VZGOJITELJEM PREDŠOLSKE VZGOJE ZA RAZVOJ MIŠLJENJA OTROK

Eva Koželuhová, Barbora Loudová Stralczynská
Karlova univerza, Pedagoška fakulteta, Praga, Češka
eva.kozeluhova@pedf.cuni.cz, barbora.loudova@pedf.cuni.cz

Namen prispevka je predstaviti inovativne učne pristope k teoretičnim in praktičnim modulom, ki so bili zasnovani za podporo študentom študijskega programa predšolska vzgoja na področju razvoja komunikacije in kritičnega mišljenja. Podatki so bili zbrani z vsebinsko analizo seminarskih nalog študentov (N=185) in iz refleksivnih poročil študentov (N=185). Podatki so bili analizirani z odprtim in tematskim kodiranjem. Rezultati so pokazali, da so študenti, ki so imeli možnost študirati pri integriranem predmetu z uporabo podpornih gradiv, dosegli boljše rezultate v vseh spremljanih kategorijah kot študenti, ki so študirali po prvotnem študijskem načrtu. Ta primerjava poudarja pomen integriranega pristopa k pripravi bodočih učiteljev, kjer v okviru obsežnih učnih modulov pridobijo celosten pogled na preučevano problematiko.

1   Introduction

The postmodern society places increased demands on pre-primary education, which needs to reflect and innovate its approaches to children's education in order to meet the current needs of children and the future challenges of life in the perspective of children's future living and learning (UNESCO, 2015; Mohammed, 2023). From the perspective of new institutionalism (Steinmo, 2008), education does not always reflect the needs of society. Often it retains approaches conditioned by previous developments and reflects beliefs, routines and norms in specific pedagogical processes (Kratochvíl, 2008). As a result of changes in society, such as the emergence of AI, the need to equip the next generation with competences that enable them to respond to new conditions and situations is increasingly coming to the fore. However, the results of the PISA and PIRLS surveys in the area of reading literacy have long shown that Czech pupils do not reach a sufficient level in the area of comprehension related to thinking. Specifically, this concerns evaluative and critical comprehension. The indicators monitored in the PIRLS international testing, which are information retrieval, the ability to draw conclusions, interpret information and evaluate text, reveal that Czech pupils are successful in literal and inferential comprehension, but have difficulties in interpreting and evaluating text (Czech School Inspectorate, 2023). In order to be able to interpret and evaluate text or information, individuals need to use higher cognitive processes, such as, in particular, discovering causal relationships, drawing on prior experiences and looking for analogies. Therefore, it is crucial that the development of children's independent, creative and critical thinking is emphasized already in pre-primary education, not only in the context of developing future literacy skills (Košťálová, 2017; Salmon, 2010; Snow, 2002; Broek & Kremer, 2000). Research shows that critical thinking can be learned (Tishman et al., 1995; Ritchhart & Perkins, 2005; Williams & Moore, 2021). In order to do this, future teachers need to be equipped with the knowledge and skills that will enable them to effectively support children's independent thinking and their ability to think critically, evaluate, and make decisions (Moiko et al., 2022).

2   Theoretical backgrounds

The interaction between the teacher and the student is important for the effectiveness of learning (Nelešovská, 2005). The condition for effective communication is the acquisition of a certain level of communication competence.

In our case, we will focus on the teacher, and thus here it is possible to define the teacher's ability to choose appropriate motivational, activating, communicative and feedback information; as well as to code the information adequately to the level of the child, to structure the information and to prepare the course of the communication situation in a desirable way. To communicate effectively, the teacher shall reflect the cognitive, affective and regulatory components of communication with the child (Gavora & Lyková, 2005; Mareš & Křivohlavý, 1995). Effective communication is characterized by descriptive language, expressing clear information, sharing one's own emotions, needs and expectations, and opening opportunities for active participation of the child in decision-making. Internal and external aspects influence the effectiveness of learning. Internal aspects include the child's characteristics, their cognitive abilities (Mareš, 1998). Internal aspects are innate, yet they can be influenced to some extent. These are genetic predisposition, temperament, intellect, the child's character and motivation to learn (Wildová et al., 2021). External aspects include the personality of the teacher, as well as the climate and physical environment of the pre-school and the classroom and the child's social environment, or external motivational incentives. These aspects can positively or negatively influence the course and outcomes of educational processes.

2.1   Activating communication

For the effectiveness of learning and personality development of the child, it is essential to be active in the educational process, for which we use activating teaching methods. In the field of communication, these include Socratic conversation (the teacher's questions stimulate the child's thinking), discussions and brainstorming (Skalková, 2007). The basic pillar of these verbal methods are questions. Questions are part of the development of a child's thinking from the earliest age (Fisher, 2011; Vágnerová, 2012), which is why they can be used in pre-primary education.

Teachers are most likely to ask questions. However, it depends on how the questions are formulated to effectively help children learn. Švaříček (2011) points out that there is no direct link between the number of questions of a certain type and the level of children's learning achievements. Thus, it is a question of quality and also of the context in which the questions are asked. Similarly, Fisher (2011) argues that too many questions of lower cognitive level lead to a reduction in children's willingness to participate and reflect more on the answers and that it is therefore important to

ask questions that will develop a cognitive conflict. Research by Šeďová and Sedláček (2023) suggests that teachers should actively engage all children as there is a relationship between educational achievement and their engagement. Moreover, engaging children, including those from socially disadvantaged backgrounds, helps to close the achievement gap between children and improves educational outcomes, regardless of gender or level of disadvantage (Šeďová et al., 2019). As critical thinking can be learned by children (Redecker et al., 2011), it is desirable to create opportunities for this from an early age, ideally combining verbal communication with other means of expression (Sorochynska & Hohola, 2022; Williams & Moore, 2021).

This implies that in pre-primary education, it is important for the teacher to be able to create space for children to discuss with each other, to formulate questions of higher cognitive complexity that will activate children's thinking, and to bring interesting topics that present a cognitive challenge for children. For pre-school children, these may be the types of questions listed in Table 1.

Table 1: **Types of teacher questions of higher cognitive demand. Elaborated according to Wildová et al. (2019)**

Type of question	Description
Judgment	This type of question leads children to make a conclusion based on the facts in the statement. The child has to discover interrelationships and distinguish the essential from the non-essential.
Application	This type of question encourages children to think about how they can use the information.
Evaluation	This type of question invites children to take a personal stance on the issue. The child is expected to be able to support their position with arguments.

2.2 Preparation of future pre-school teachers for the development of children's thinking at the Faculty of Education, Charles University

The preparation of future teachers ought to be based on the needs of practice, with an emphasis on the development of didactic competence of the student (Koželuhová & Wildová, 2021; Starý et al., 2012). This requires a functional link between theory and practice and the development of reflective skills (Dymoke & Harrison, 2008). The model of the teacher as a reflective practitioner who is able to observe, analyse and change the sub-moments of the educational process is

emphasised in the current conception of the preparation of future teachers (Korthagen et al., 2011; Syslová, 2017; Vítečková, 2018). An important role in this preparation is provided by the use of video recordings, either of the student's own pedagogical work or of examples from practice (Janík et al., 2009). Simultaneously, it is essential to ensure long-term sustainability, sufficient opportunities for the immediate application of theoretical knowledge and developed skills. The time it takes individual students to master a skill varies considerably. The continuity of the training programme is therefore one of the factors of its effectiveness (Šeďová et al., 2016).

Stimulating children's thinking is not an easy task, especially if in practice we encounter a persistent conception of the role of the teacher as the dominant actor in the educational process. Therefore, when considering how to help students develop their communicative competence, we assumed a close link between the development of thinking and the level of understanding of the literary text that is read to children. We hypothesized that working with children's literature might help students plan educational content to encourage children's independent thinking through their questions. Consequently, we analysed the existing curriculum in terms of the content devoted to the areas of language and communication development, pre-literacy and literary education.

In the original curriculum of the Faculty of Education at Charles University, the language and literature areas were covered by six different courses, which students had to spread over three years of study. These were the courses Literature for Children I and II, Culture of Spoken Language, Czech Language in Pre-school Education, Literature for Children with Didactics and Developing Reading Literacy. Each course was given 1 to 2 teaching hours per week and the results of students were very varied and inconsistent. In practice, the educational content of each course overlapped, or students encountered some content repeatedly in different courses. Other areas, on the other hand, remained hidden from them, believing that students had already been exposed to the content in a previous course. Another shortcoming seemed to be the fragmentation of the content, where students lacked an understanding of how the areas of literature, language development and pre-school didactics were interconnected. For this reason, there has been a radical change in the preparation of future pre-school teachers in the field of language and literacy development and the related development of the child's thinking.

2.3   The proposed innovation of the training of future pre-school teachers

The primary foundation was the establishment of cooperation between teachers from three different departments of the faculty - the Department of Czech Language, the Department of Czech Literature and the Department of Pre-Primary and Primary Education. Teachers of these departments considered together how to logically organize and connect the educational content so that students could get to know it comprehensively and in its entirety. A new course has been created, a two-semester course - Language, Communication and Literacy Development - which emphasises the interconnectedness of all the components. The course runs 4 hours per week in the winter term and 2 hours per week in the summer term of the first year of study. This provides students with the necessary foundation right at the beginning of their studies when their professional self-concept is just taking shape. It is therefore already during this period that they encounter the idea of the role of teacher-facilitator of the child's learning.

The instruction of individual university teachers builds on each other during the course, or the teachers use tandem teaching. They cover topics such as definitions of literacy and preliteracy, the development of productive and receptive language competence of children, the basic communication theories, the fundamentals of rhetoric and the development of a cultivated speech of a teacher. This is followed by an introduction and mastery of constructivist teaching methods appropriate for the pre-school age. These include the E-U-R model of learning and reading strategies with an emphasis on comprehension development. Students are introduced to literary types and genres as well as criteria for selecting a quality literary text. The course concludes with an exam in which students demonstrate knowledge and skills in the entire field. The content of the course is then linked to the content of the course Theory and Didactics of Early Childhood Education I, where students gain additional theoretical knowledge, and to the teaching practice, where they acquire practical experience under the guidance of mentors.

Supporting study materials for the course were gradually developed within the project. It was a Moodle course that includes a methodological guide for working with critical thinking methods in pre-primary education and video demonstrations of the use of individual methods in practice. The students were provided with a website containing suggestions for contemporary children's literature and sample

reading lessons, examples of good practice created by their fellow students. These support materials were also offered for use to third year students who were still studying according to the original curriculum. The innovation was based on changes in teaching structures, requiring interdisciplinary cooperation and the use of new forms of teaching. It meant a lot of effort for university lecturers. We were therefore interested in how effective this innovation was and whether it had the expected benefits for the quality of students' pedagogical work.

3   Methods

Table 2: Characteristics of the research group

	Academic Year	Form of Study	Year of Study	Number of students	Study support
A	2021/22	full-time	3rd	25	Studying according to the original accreditation
B	2022/23	full-time	3rd	33	Studying according to the original accreditation using educational materials (videos, methodology, Moodle course with practice examples)
C	2021/22	part-time	3rd	20	Studying according to the original accreditation
D	2022/23	part-time	3rd	14	Studying according to the original accreditation using educational materials (videos, methodology, Moodle course with practice examples)
E	2021/22	full-time	1st	20	Studying according to the new teaching concept without additional study support
F	2022/23	full-time	1st	25	Studying according to the new teaching concept using educational materials (videos, methodology, Moodle course with practice examples)
G	2021/22	part-time	1st	17	Studying according to the new teaching concept without additional study support
H	2022/23	part-time	1st	33	Studying according to the new teaching concept using educational materials (videos, methodology, Moodle course with practice examples)

The aim of the study was to assess the effectiveness of an innovation in the professional training of future pre-school teachers. The research was carried out in the academic years 2021/22 and 2022/23 among first- and third-year students of the full-time and part-time forms of the Pre-school Teacher Education Programme. The total number of students was 185 (N=185). A detailed overview of the individual study groups is presented in Table 2.

3.1   Research Questions

1. How has the change in the design of the students' training affected their level of competences enabling them to support the development of children's thinking?
2. What supports students to be able to stimulate the development of children's thinking?

3.3   Data collection and data analysis

A qualitative approach was used in a multi-case study design (Yin, 2003). A case is understood as always one group of students in a study programme in a particular academic year (see Table 2). The data were collected through content analysis (Mayring, 2000) of students' seminar papers, reflective reports and responses. The seminar papers had the same assignment for all students – to design a one-week thematic blocks for pre-school children based on a literary text. Assessment criteria were developed for the data collection in research and students were made aware of these in their courses. Students' work was assessed by two independent assessors who supplemented the work with feedback. Reflective reports were submitted anonymously by students in the Moodle course environment after studying the course materials.

Pre-determined categories were followed in the seminar papers (Table 3).

The categories were defined in relation to the theoretical backgrounds, i.e. mainly the quality of the teacher's questions and the chosen topic, and in relation to didactic aspects, i.e. the formulation of educational objectives and the forms and methods of education. The occurrence of each category in the student's paper was scored 1 point; in total, each group could score a maximum number of points in one category

equal to the number of students in that group (e.g., Group A of 25 members could score just 25 points in each individual category observed). For the purpose of comparing the results, the results were then expressed as percentages indicating how many students in a given study group were able to meet the requirements of the category under study, i.e. have the necessary competences. Firstly, the individual case-study groups were analysed, and their results were then compared.

Table 3: Analytical categories

Category	Description
Questioning	The student uses open-ended questions of a higher cognitive level, i.e. judgment, evaluation and application questions, which stimulate children's independent thinking.
The E-U-R model of learning	The student proposes a functional division of individual lessons so that the parts of evocation, understanding and reflection are included.
Educational plan	The student clearly defines what he/she wants to achieve with the children, what topics he/she wants to open, why he/she wants to implement the thematic unit with the children.
Educational goals	The student formulates educational goals that correspond to the declared intention, planned educational activities and that are evaluable.
Choice of children book	The student chooses a book (fiction or nonfiction) that corresponds to the didactic purpose and age of the children and that provides them with space for independent thinking.

Reflective reports were analysed using open coding, where individual student statements were divided into data segments that were assigned individual codes. These were subsequently grouped into clusters (Švaříček & Šeďová, 2014). The data from the reflective reports are used to contextualise the results generated from the content analysis of the students' work. The investigation was conducted in accordance with the Code of Ethics of the Charles University.

4 Results

4.1 How has the change in the design of the students' training affected their level of competence to support the development of children's thinking?

The results of the analyses of the student papers showed that there was a significant shift in student performance in all categories for all study groups. For groups A, B, C, D, these were students who studied within the original curriculum, so they took

6 different courses at different times and the educational content was not presented consistently. We can see in Fig. 1 that the use of supporting study materials in the form of methodological materials and video demonstrations led to a better performance (B and D) compared to the study groups without supporting materials. Students made the most significant progress in their ability to use constructivist teaching methods, particularly in the application of the three-phase learning model, although the results are not yet satisfactory. Only 67% of full-time students and 50% of part-time students were able to apply constructivist methods almost at the end of their studies, drawing on children's knowledge and preconceptions and designing learning activities effectively to lead to the intended goals. The formulation of educational goals was also problematic (76% and 50%), although even here there has been a significant improvement. Students were unable to define educational goals in a way that could be evaluated. The most common error was to copy the expected outcomes from the national framework for pre-school education or to replace them with a description of the activity the children will complete. Full-time students achieved better results than part-time students.
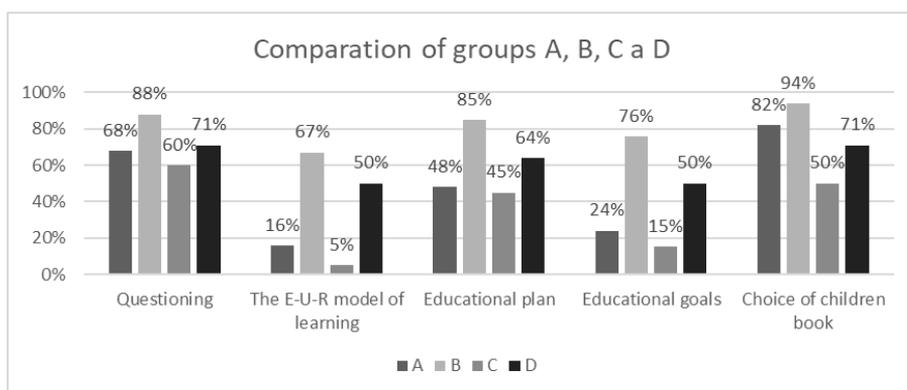
Figure 1: Comparison of the results achieved by third-year students, full-time and part-time forms.
Source: own.

4.2 What supports students to be able to stimulate the development of children's thinking?

It is interesting to compare the results of the third-year students studying in the original accreditation and the first-year students, where neither group had access to study support materials. The only difference between the groups was the coherence

of the related educational content of the original 6 courses into one course for first-year students. It appeared that this change had already led to improvements in most categories (Figure 2). Students who had the whole issue presented in one coherent course were better able to use the individual theoretical knowledge and practical skills. However, the more significant shifts were for part-time students (Group G), who seem to have more difficulty in synthesising all the theoretical knowledge in practice.
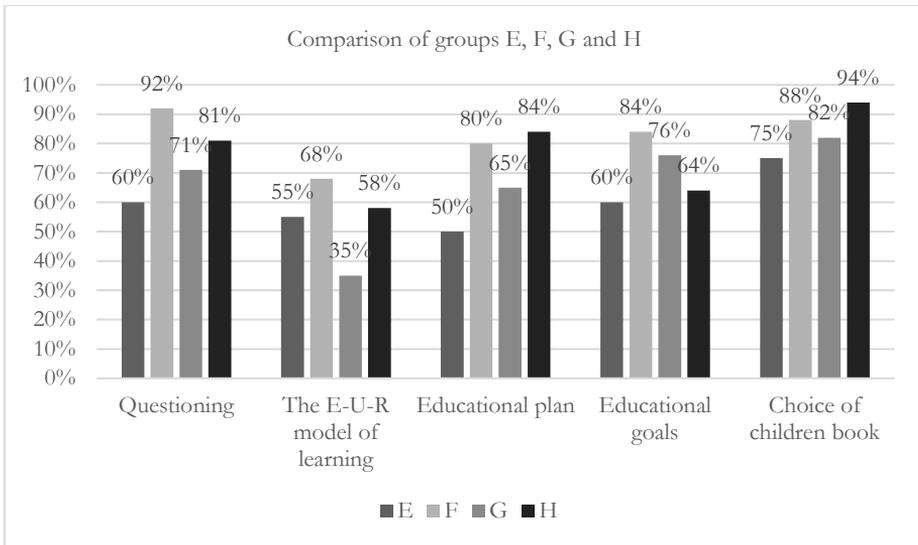
Figure 2: Comparison of the results achieved by first-year students, full-time and part-time forms.
Source: own.

If we compare the results of students who have already had the opportunity to study in a comprehensively upgraded course, i.e. benefited both from the integration of several courses and from the existence of supporting study materials (first years, groups F and H), with students who have not had this opportunity (third years, groups B and D), we come to a surprising conclusion. In fact, first-year students after their first year of study performed either almost the same or even higher than their fellow-students at the end of their studies in all the categories studied (Figure 2). This comparison indicates the importance of both an integrated approach to the preparation of future teachers, whereby they gain a holistic view of the subject matter

studied in large teaching modules, and support in the form of videos and concrete examples of good practice.
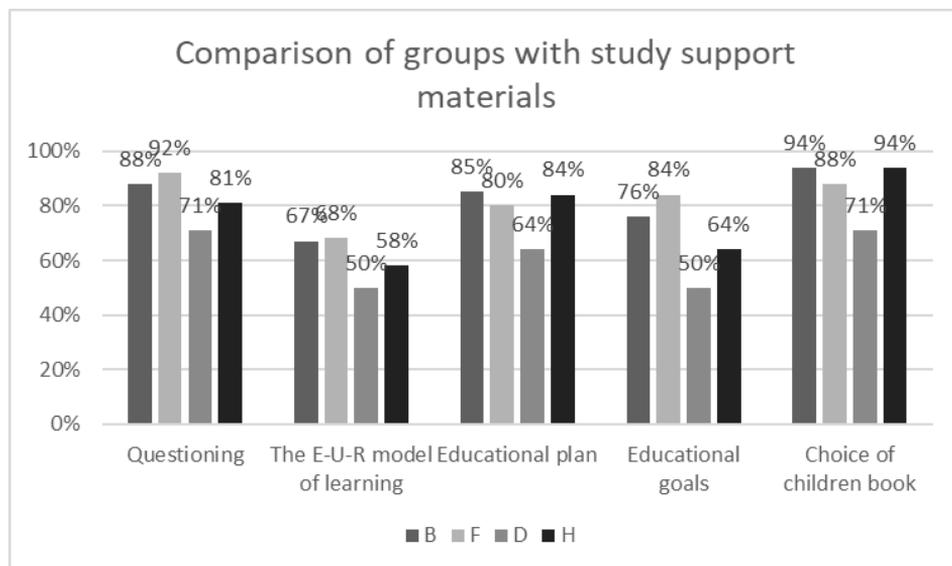
Figure 3: Comparison of the results achieved by third- and first-year students (both years had study support materials at their disposal)
Source: own.

5   Discussion and conclusion

The aim of the research was to evaluate the effectiveness of the innovation in the preparation of future pre-school teachers at the Faculty of Education, Charles University. We analysed how the change in the design of the students' preparation has affected their level of competence to support the development of children's thinking, and what helps student teachers to be able to support the development of children's thinking. The results indicated that the proposed measures led to an increase in the quality of the students' outcomes – students were better able to interact with children and facilitate the development of their thinking. Implemented were (1) the integration of the educational content of several courses into a longer-term educational module, (2) its connection with teaching practices, and (3) the creation of supporting learning materials. Students performed better in all the monitored indicators related to the use of activation methods in teaching and supporting children's thinking development than students who studied in the

curriculum before the innovation was introduced. It is important to highlight that this improvement is all the more significant as a result of the inclusion of learning support materials in the curriculum, even for students who spent most of their study time learning online during the covid pandemic (groups B and D), where on the contrary we would have expected a slight decrease due to more difficult conditions. This corresponds with other research on the development of students' competences when using online learning features (Andrade-Arenas et al., 2023).

The essence of the innovation was the integration of the courses into a modular course. The modularisation is one of the developments in teacher education in Europe (Loudová Stralczynská et al., 2022; Nelešovská & Šmelová, 2023; Vlčková, 2010) and in higher education (Li & Pilz, 2016). It is the positive contribution of the modular course to the development of students' competences that is significant for the further direction of the reaccreditation of the curriculum towards a more clearly structured, pervasive and interdisciplinary model.

Of the indicators observed, students continue to find it most difficult to use constructivist methods (especially the three-phase learning model) and to formulate learning goals, which corresponds with another research outcomes (Stará & Starý, 2018; Syslová et al., 2019). Therefore, it is essential to develop these skills in further follow-up courses and to deepen the acquired knowledge in the context of other disciplinary didactics and in the context of contextual teaching practices. These findings place demands on the quality of mentors in teaching practice.

A challenge for further development is the lower attainment of part-time students already working as pre-school teachers. Their established patterns and pedagogical practices are sometimes, paradoxically, a certain burden that students need to overcome. Research findings suggest that preschool practice is still dominated by approaches to educational content planning that are consistent with a sociocentric and teacher-centred conception of education (Opravilová, 2016), and that children have little space in these pedagogical environments to be active agents of their learning and to develop critical and creative thinking (Koželuhová et al., 2020; Loudová Stralczynská et al., 2024). This corresponds with our theoretical framework of new institutionalism (Steinmo, 2008), as it is the poorer outcomes of student-teachers in practice that point to internal aspects in the culture of pre-schools, which maintain 'tried and tested' approaches and are less receptive to innovative strategies

from outside. This finding reinforces our belief in the importance of involving professional reflection into student teachers' learning (Dymoke & Harrison, 2008) as an important part of their professional competence development.

Acknowledgments

References

Andrade-Arenas, L., Perez, W. & Arias, C. (2023). Moodle platform and Zoom videoconference: learning skills in the virtual modality. *Indonesian Journal of Electrical Engineering and Computer Science,* 31(1), 337-349. http://doi.org/10.11591/ijeecs.v31.i1.pp337-349

Bandura, A. (2001). Social Cognitive Theory: An Agentic Perspective. *Annual Review of Psychology*, 52(1), 1-26. https://doi.org/10.1146/annurev.psych.52.1.1

Broek, P. v. d., & Kremer, K. (2000). The mind in action: What it means to comprehend during reading. In B. M. Taylor, M. F. Graves, & P. v. d. Broek (Eds.), *Reading for meaning: Fostering comprehension in the middle grades*, 1-31. International Reading Association.

Czech School Inspectorate. (2023). *Mezinárodní šetření PIRLS 2021. Národní zpráva.* [International PIRLS 2021. National report]. Prague.

Dymoke, S., & Harrison, J. (2008). *Reflective Teaching and Learning. Developing as a Reflective Secondary Teacher.* SAGE.

Fellowes, J., & Oakley, G. (2010). *Language, Literacy and Early Childhood Education.* Oxford University Press.

Fisher, R. (2011). *Učíme děti myslet a učit se: praktický průvodce strategiemi vyučování.* [Teaching children to think and learn: a practical guide to teaching strategies]. Portal.

Fontana, D. (2014). *Psychologie ve školní praxi: příručka pro učitele.* [Psychology in school practice: a handbook for teachers]. Portal.

Gavora, P., & Lyková, V. (2005). *Učitel a žáci v komunikaci.* [Teacher and students in communication]. Paido.

Havigerová, J. M. (2013). *Projevy dětské zvídavosti: získávání informací a kladení otázek od předškolního věku v kontextu intelektového nadání.* [Manifestations of children's curiosity: information acquisition and questioning from pre-school age in the context of intellectual giftedness]. Grada.

Janík, T., Janíková, M., Knecht, P., & Najvar, P. (2009). Video jako prostředek rozvíjení učitelových didaktických znalostí obsahu [Video as a means of developing teachers' didactic content knowledge]. In: T. Janík et al: *Možnosti rozvíjení didaktických znalostí obsahu u budoucích učitelů.* [Possibilities of developing didactic content knowledge in future teachers]. Brno: Paido, 83-96.

Korthagen, F. A. J., Kessels, J., Koster, B., Lagerwerf, B., Wubbels, T., Najvar, P., & Najvarová, J. (2011). Jak spojit praxi s teorií: didaktika realistického vzdělávání učitelů . [How to connect practice with theory: didactics of realist teacher education]. Paido.

Košťálová, H. (2017). *Čtenářské kontinuum.* [The reading continuum]. Helping schools to succeed.

Koželuhová, E., Loudová Stralczynská, B., & Lipnická, M. (2020). Planning educational content in school curriculum documents: Examples of current practice from pre-schools in the Czech Republic and Slovakia. *Pedagogika*, 70(4), 563-586. https://doi.org/10.14712/23362189.2020.1678

Koželuhová, E., & Wildová, R. (2021). *Čtenářské strategie v předškolním vzdělávání.* [Reading strategies in pre-school education]. Charles University, Faculty of Education.

Kratochvíl, P. (2008). *Teorie evropské integrace*. [Theory of European integration]. Portal.

Li, J. & Pilz, M. (2016). Modularisation in the German VET system: a study of policy implementation. *Journal of Education and Work*. 1-15. https://doi.org/10.1080/13639080.2016.1243233

Loudová Stralczynská, B., Koželuhová, E., Syslová, Z., & Ristić, P. (2024). Curriculum design and content in Czech pre-primary education: approaches and experiences of student teachers. *European early childhood education research journal*, 32(1), 7-21. https://doi.org/10.1080/1350293X.2023.2234111

Loudová Stralczynská, B., Stará, J., Selbie, P., & Ristić, P. (2022). Educating pre-primary and primary teachers today: quality initial professional studies for teachers in six European Union countries. Pedagogická fakulta, Univerzita Karlova.

Mareš, J. (1998). *Styly učení žáků a studentů*. [Learning styles of pupils and students]. Portal.

Mareš, J., & Křivohlavý, J. (1995). *Komunikace ve škole*. [Communication in school.] Masaryk University.

Mayring, P. (2000). Qualitative Content Analysis. Forum Qualitative Sozialforschung. *Forum: Qualitative Social Research*, 1(2), https://doi.org/10.17169/fqs-1.2.1089

Mohammed, A. S. (2023). *Perspectives on Pre-school Education and Care*. https://doi.org/10.5772/intechopen.111745

Moiko, O., Predyk, A., Bakhmat N., Kravchuk, O., Streletska N. & Zakharova, H. (2022). The Efficiency of Using New Information and Communication Technologies in Primary School Lessons: the E-Learning Experience. *Postmodern Openings*. 13(4), 199-215. https://doi.org/10.18662/po/13.4/514

Nelešovská, A. (2005). *Pedagogická komunikace v teorii a praxi: význam komunikace, vztah učitele k žákovi, komunikace ve škole, ukázky*. [Pedagogical communication in theory and practice: the importance of communication, the relationship between the teacher and the student, communication in school, examples]. Grada.

Nelešovská, A. & Šmelová, E. (2023). *Modularizace a její aplikace v bakalářském studijním oboru Učitelství pro MŠ*. [Modularization and its application in the bachelor's degree in teaching for Kindergarten]. Palacký University, Faculty of Education.

Opravilová, E. (2016). *Předškolní pedagogika*. [Pre-school pedagogy]. Grada.

Redecker, C., Ala-Mutka, K., Leis, M., Leendertse, M., Punie, Y., Gijsbers, G., Kirschner, P., Stoyanov, S., & Hoogveld, B. (2011). *The Future of Learning: Preparing for Change*.

Publications Office of the European Union.

Ritchhart, R., & D. Perkins. (2005). Learning to think: The challenges of teaching thinking. In K. J. Holyoak & R. G. Morrison eds. *Cambridge handbook of thinking and reasoning*, 775-802. Cambridge University Press.

Salmon, A. K. (2010). Engaging Young Children in Thinking Routines. *Childhood education*, 86(3), 132-137. https://doi.org/10.1080/00094056.2010.10523133

Skalková, J. (2007). *Obecná didaktika: vyučovací proces, učivo a jeho výběr, metody, organizační formy vyučování*. [General didactics: teaching process, curriculum and its selection, methods, organizational forms of teaching]. Grada.

Snow, C. E. (2002). *Reading for understanding: toward an R&D program in reading comprehension*. Rand.

Sorochynska, O. & Hohola, I. (2022). Pedagogical tools for the development of the fundamentals of critical thinking in pre-school children in the process of getting to know the natural environment. *Zhytomyr Ivan Franko state university journal. Pedagogical sciences*, 2(109), 29-45. https://doi.org/10.35433/pedagogy.2(109).2022.29-45.

Stará, J., & Starý, K. (2018). Výukové cíle aneb cesta tam a zase zpátky. [Learning objectives or the journey there and back again]. *Pedagogika*, 68(2). https://doi.org/10.14712/23362189.2017.1033.

Starý, K., Dvořák, D., Greger, D., & Duschinská, K. (2012). Profesní rozvoj učitelů: Podpora učitelů pro zlepšování výsledků žáků. [Teacher professional development: Supporting teachers to improve student achievement]. Karolinum.

Steinmo, S. (2008). Historical institutionalism. In D., Della Porta, & M., Keating, *Historical institutionalism* (pp. 118-138). Cambridge University Press. https://doi.org/10.1017/CBO9780511801938.008.

Syslová, Z. (2017). *Učitel v předškolním vzdělávání a jeho příprava na profesi.* [Teacher in pre-school education and his/her preparation for the profession]. Masaryk University.

Syslová, Z., Burkovičová, R., Kropáčková, J., Šilhánová, K., & Štěpánková, L. (2019). *Didaktika mateřské školy.* [Didactics of kindergarten]. Wolters Kluwer.

Šeďová, K., & Sedláček, M. (2023). How vocal and silent forms of participation in combination relate to student achievement. *Instructional science*, 51(2), 343-361. https://doi.org/10.1007/s11251-022-09609-1

Šeďová, K., Sedláček, M., Švaříček, R., Majcík, M., Navrátilová J., Drexlerová, A., Kychler, J. & Šalamounová, Z. (2019). Do those who talk more learn more? The relationship between student classroom talk and student achievement. *Learning and instruction*, 63, 101217. https://doi.org/10.1016/j.learninstruc.2019.101217

Šeďová, K., Švaříček, R., Sedláček, M., & Šalamounová, Z. (2016). *Jak se učitelé učí: cestou profesního rozvoje k dialogickému vyučování.* [How teachers learn: a professional development path to dialogic teaching]. Masaryk University.

Švaříček, R. (2011). Funkce učitelských otázek ve výukové komunikaci na druhém stupni základní školy [The function of teacher questions in teaching communication at the second level of primary school]. *Studia paedagogica*, 16(1), 9-46.

Švaříček, R., & Šeďová, K. (2014). *Kvalitativní výzkum v pedagogických vědách.* [Qualitative research in educational sciences]. Portal.

Tishman, S., Perkins, D., & Jay, E. (1995). *The thinking classroom: Learning and teaching in a culture of thinking.* Allyn & Bacon.

UNESCO. (2015) Education 2030: *Incheon Declaration and Framework for Action. Towards inclusive and equitable quality education and lifelong learning for all.* http://unesdoc.unesco.org/images/0024/002432/243278e.pdf accessed 2016-05-19.

Yin, R. K. (2003). *Applications of case study research.* SAGE.

Vágnerová, M. (2012). *Vývojová psychologie: dětství a dospívání.* [Developmental psychology: childhood and adolescence]. Karolinum.

Vítečková, M. (2018). *Začínající učitel: jeho potřeby a uvádění do praxe.* [Beginning teacher: their needs and putting into practice]. Paido.

Vlčková, I. (2010). Proces modularizace studijních programů na vysokých školách v ČR a SRN. [The process of modularization of study programs at universities in the Czech Republic and Germany]. *ACC journal*, 16(2), 136-145.

Wildová, R., Koželuhová, E., Ronková, J., Kucharská, A. & Špačková, K. (2021). *Didaktika počáteční čtenářské gramotnosti a pregramotnosti.* [Didactics of early literacy and preliteracy]. Charles University, Faculty of Education.

Wildová, R., Vykoukalová, V., Rybárová, E., Ronková, J. & Harazinová, R. (2019) *Rozvoj čtenářské pregramotnosti prostřednictvím čtenářských strategií; Metodická příručka pro učitele mateřských škol pro práci s pohádkou a pověstí.* [Developing literacy through reading strategies; Methodological guide for kindergarten teachers for working with fairy tales and stories.] Charles University, Faculty of Education.

Williams, Neisha & Moore, Schontal. (2021). The Role of a Selected Thinking Routine in the Development of Critical Thinking Skills in Pre-school Students. *Caribbean Journal of Education*, 43(2), 47-68. https://doi.org/ 43. 47-68. 10.46425/c034302b9859

Characteristics, Challenges, and Proposals for the Improvement of Short Pre-school Education Programmes in Slovenia : Analysis of Focus Groups

Ana Tina Jurgec, Barbara Bednjički Rošer
University of Maribor, Faculty of Education, Maribor, Slovenia
ana.jurgec1@um.si, barbara.bednjicki@um.si

Our research focuses on the implementation of short pre-school education programmes in Slovenia, intended for children who had not been enrolled in kindergarten in the year prior to entering primary school. The purpose of the study was to recognise the characteristics, challenges, and potential programme improvement proposals. Data obtained through focus groups consisting of professional staff having implemented the short programme in previous years were collected through semi-structured interviews and analysed using qualitative content analysis in the Atlas.ti software. The study reveals a systemic change need in the short programme. The participants highlighted challenges pertaining to access to data on children not enrolled in pre-school education, linguistic and cultural communication barriers and the programme organisation at the level of kindergarten and state level. Only coordinated approaches at all levels - from individual kindergartens to national guidelines - can ensure optimal development and further learning conditions of pre-school children.

Značilnosti, izzivi in predlogi izboljšav izvajanja krajših programov predšolske vzgoje v Sloveniji: Analiza fokusnih skupin

Ana Tina Jurgec, Barbara Bednjički Rošer
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
ana.jurgec1@um.si, barbara.bednjicki@um.si

Raziskava se osredotoča na izvajanje krajših programov predšolske vzgoje v Sloveniji, ki so namenjeni otrokom, ki v letu pred vstopom v osnovno šolo še niso bili vključeni v vrtec. Namen raziskave je bil prepoznati značilnosti, izzive in morebitne predloge za izboljšanje programa. Podatke, pridobljene s fokusnimi skupinami, v katerih so sodelovali strokovni delavci, ki so v preteklih letih izvajali krajši program, smo zbirali s polstrukturiranim intervjujem in jih analizirali v skladu s kvalitativno vsebinsko analizo v programskem orodju Atlas.ti. Raziskava razkriva potrebo po sistemskih spremembah krajšega programa. Izpostavljeni so bili izzivi dostopnosti podatkov o otrocih, ki niso vključeni v predšolsko vzgojo, jezikovne in kulturne bariere v komunikaciji in organizacija na ravni vrtcev in ravni države. Le z usklajenimi pristopi na vseh ravneh – od posameznega vrtca do nacionalnih smernic – lahko zagotovimo optimalne pogoje za razvoj in nadaljnje učenje predšolskih otrok.

Univerzitetna založba
Univerze v Mariboru

1   Introduction

Participation of children in pre-school education programmes is a crucial step towards their optimal development. The positive effects thereof can be primarily observed as pertaining to the social and speech development, learning, and later academic success of children (Lynch, 2004; Marjanovič Umek, 2014; Morgan, 2019; Rutar, 2018; Vonta, 2009). These benefits are also highlighted in the fundamental principles of pre-school education in kindergartens emphasising the need for equal development opportunities for all children while considering differences arising from their social, cultural, and linguistic backgrounds. Creating an inclusive educational environment that respects diversity and promotes the comprehensive development of each child is the foundation for building a more open and tolerant society (Curriculum for Kindergartens, 1999; Ginner Hau et al., 2022). In this context, understanding how quality pre-school education contributes to effective learning, social development, and the acquisition of fundamental skills that enable children to successfully and independently transition into the school environment is crucial. Therefore, it was decided to investigate the implementation characteristics of short pre-school education programmes in Slovenia. Subsequently, it was focused on the organisation of these short programmes from the perspective of regulations, statutes, and recommendations. This chapter is concluded with theoretical foundations and the definition of the purpose of our study.

1.1   Short pre-school education programmes in Slovenia

In Slovenia, preschool education in public kindergartens, established by municipalities, is conducted by 108 independent public kindergartens and 209 primary schools with kindergarten units. The professional basis for their operation is the national document 'Curriculum for Kindergartens' (1999, p. 7), which, considering its peculiarities, also forms the professional foundation for the implementation thereof. The short programme is intended for pre-school children who had not been enrolled in kindergarten in the year before entering primary school. Departments conducting short programmes in independent public kindergartens or kindergartens at primary schools are funded entirely by the state budget for up to 240 hours and are free of charge for parents. These short programmes in Slovenia (Cotič Pajntar & Zore, 2018, p. 3) serve to ensure a higher degree of inclusion of children of the second age group in the institutional system

of education and training, significantly shaping and conditioning the quality of a child's life. Moreover, studies (Ansari, 2018; Blau, 2021; Mlekuž, 2022; Vonta, 2009) confirm that the positive effects of pre-school education are long-lasting and establish foundations for lifelong learning. Jacques Van der Gaag (2002) states that quality pre-school programmes (ECD – early child development) are an investment in the future, as the long-term effects of quality pre-school education are linked to the development of humanity.
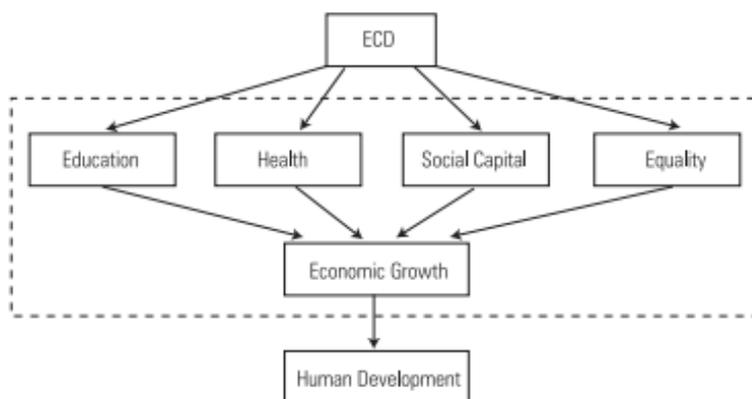
Figure 1: From Child Development to Human Development: A Comprehensive Framework.
Source: Van der Gaag, 2002, p. 76.

When planning, implementing, and monitoring educational work in the short programme, it is essential to ensure a balance of activities aimed at gradually acclimating children to institutional education and facilitating a smoother transition into school (Cotič Pajntar & Zore, 2018). The organisation of the short programme is defined by the Regulation on the Organization, Operation, and Funding of Kindergarten Departments Implementing Short Programs and Funded from the State Budget (Official Gazette of the RS, No. 42/2018). It is important that short programme groups of children operate independently and, in accordance with the conditions of the public tender, provide a space – a playroom that meets the prescribed requirements for a department of the second age group and a professional worker who meets the pre-school educator requirements. Kindergartens meeting the public tender conditions can apply for the implementation of the short programme by the end of April in the current school

year. Its implementation must not exceed four hours per day and sixteen hours per week and must include an optional meal (Hlastan-Ribič et al., 2008), contributing to the formation of dietary habits and a positive attitude towards a healthy diet. The regulation (Official Gazette of the RS, No. 42/2018) stipulates that a short programme groups can include from eight to twelve children. If the program is, however, implemented in a demographically endangered area and/or includes children of immigrants or parents with international protection, the minimum short programme implementation standard is five children allowing special attention to be paid to linguistically disadvantaged children (Bednjički Rošer, 2021), as the gradual acquisition of Slovenian and cooperation with parents (Ansari et al. 2018; Licardo & Oliveira Leite, 2021, 2022) are fundamental for facilitating and accelerating their integration. A special feature is also the implementation of the short programme in areas inhabited by members of the Hungarian national community, as educational work is conducted bilingually and the programme is implemented by two educators.

1.2   Research problem

The purpose of our study is to gain insight into the implementation characteristics of the implementation of short pre-school education programmes, identify challenges, and familiarise ourselves with improvement proposals for these programmes based on focus groups consisting of professional kindergarten staff who implemented short programs in the 2018/2019, 2019/2020, and/or 2020/2021 school years. In group discussions or focused conversations, we were interested in the views, opinions, perspectives, and arguments of practitioners. The following research questions were posed:

- what are the implementation characteristics of short pre-school education programmes in Slovenia;
- what experience have practitioners in short programmes had in relation to specific aspects of reducing social, economic, and cultural inequalities;
- the views of kindergarten practitioners regarding the added value of mandatory ECEC;
- what new programme design proposals will the practitioners make; and

- what further education and training needs have been identified by kindergarten practitioners, including in the context of making improvement proposals for existing programmes.

2   Method

2.1   Participants

Our study used a purposive non-random sample consisting of professional workers working in ten kindergartens who implemented the short pre-school education programme in the 2018/2019, 2019/2020, and/or 2020/2021 school years. All of them responded to our invitation. Educators working in short programmes, full-day programme educators, and kindergarten counselling staff were invited to join the focus groups. Management also decided to accept our invitation. Three focus groups were formed to improve the implementation of the study.

Table 1: Number (f) and structural percentages (f %) distribution of kindergarten professional staff based on their post

Kindergarten	Professional Workers	f	f %
Goriška region, Southeast Slovenia, Podravska region, Central Slovenia region	Educator in a full-day programme	9	27.3
	Educator in a short programme	15	45.5
	Counselling staff	5	15.2
	Management	4	12.0
Total		33	100.0

The three focus groups consisted of a total of 33 members of professional staff from 10 kindergartens, distributed by regions. Half of the participants were educators with experience in the short programme, followed by educators from full-day programmes without any experience in short programmes, counselling staff, and management. The groups were predominantly composed of women, with the exception of one man included as an educator in the short programme.

A. T. Jurgec, B. Bednjički Rošer: Characteristics, Challenges, and Proposals for the Improvement of Short Pre-school Education Programmes in Slovenia : Analysis of Focus Groups

81

2.2 Instrument

The measurement instrument used in our study was a semi-structured interview. Based on the research objectives, a protocol for professional kindergarten professional was drawn up, containing thematic sections with basic questions and discussion points. The content sections were as follows:

- Implementation characteristics of short programmes;
- Experience in reducing social, cultural, and economic inequalities;
- The added value of the mandatory form of the pre-school education program;
- Proposals for designing a new pre-school education program or improving existing ones;
- The need for further training of professional staff in the context of the short programme.

As facilitators of the focus groups, the protocol was used to guide discussions and assist in maintaining the structure of the conversation. Based on the protocol, a form enabling the taking of minutes for each focus group was also created.

2.3 Data collection

Data were collected as part of a national evaluation study titled "Analysis of Needs, Conditions, and Possibilities for Mandatory Inclusion of Children in One of the Pre-school Education Programmes from the Perspective of Reducing Social, Economic, and Cultural Inequalities" (Licardo et al., 2023). These data constitute only a part of the extensive study, focusing solely on the data obtained from professional kindergarten staff focus groups. Data collection was conducted in accordance with ethical research principles.

The focus groups were led by two researchers, one of them being in charge of conducting the meetings and the other in taking the minutes. The facilitators of the focus groups contacted the selected kindergartens and invited them to participate in the study. The focus groups were organised remotely via the MS Teams application at various times in May and June 2022, with the timings coordinated with the

research participants. One week before the focus group sessions, all participants received a link to the meeting by e-mail, and a reminder two days before the meeting.

At the beginning, the focus group facilitator introduced the purpose of the study to the participants, ensured the anonymity of their responses, and obtained verbal meeting recording consent (to be used for verification of the accuracy of the data recorded in the notes). This was followed by a discussion of individual questions or discussion points outlined in the focus group protocols. Based on the participants' responses, a record of each focus group's proceedings was drawn up. The discussions in the focus groups lasted about 60 minutes.

2.4   Data analysis

The analysis of data from the focus groups was conducted in accordance with qualitative content analysis. The analysis was performed using the Atlas.ti software (version 22).

The analysis procedure consisted of the following sequential steps:

- Reviewing and organising the minutes;
- The coding process, or text analysis, aimed at identifying meaningful parts of the text relevant to the research objectives (open coding);
- The categorisation process, or grouping codes into categories;
- Combining categories into thematic sections relevant to the research objectives.

3   Results

Hereinafter, the results of the focus groups according to the individual content sections outlined in Chapter 2.2 are presented.

A. T. Jurgec, B. Bednjički Rošer: Characteristics, Challenges, and Proposals for the Improvement of Short Pre-school Education Programmes in Slovenia : Analysis of Focus Groups

83

Results of the kindergarten focus groups regarding the fundamental short programme implementation characteristics

Table 2: Analysis of focus group representatives from kindergartens regarding the short programme implementation characteristics

Topic	Category	Code
Short programme implementation characteristics (17)	Good practices (3)	Cooperation between the municipality and kindergarten is key (1)
		Group-work method (4)
		Adequate logistics increase children's participation levels in SP (1)
	Challenges (10)	240 hours is not enough (2)
		Additional burden on staff (4)
		Children SP participation level challenge (3)
		Enrolment challenges (1)
		Financial challenges (1)
		Challenges for parents with children in SP (1)
		Location challenges (6)
		Staffing challenges (4)
		Need for additional competencies for educators in SP (1)
		Educators do not want to work in SP (1)
	Organisation (4)	Implementation in the afternoon (1)
		Group-work method (4)
		Organisation of hours (8)
		Rotation of educators (1)

The most frequently highlighted short programme challenges by the focus group participations were those pertaining to their implementation, followed by the characteristics related to organisation and some good practices. The most common challenges include location problems, especially spatial limitations in kindergartens implementing short programmes; lack of space, implementation in special departments, and accommodation centres. Staffing challenges also represent a significant factor, as there is a shortage of staff, consequently burdening educators who already have to perform their duties in the full-day programme. In one kindergarten, several educators rotate in the implementation of the short programme, coordinating among themselves. Participants specifically pointed out the lack of Roma assistants and additional, dedicated staff for short programmes. Therefore, the workload is shared among themselves. Kindergartens also face difficulties in obtaining data on children who had not been previously enrolled in kindergarten, for whom the short programme is in fact intended.

Regarding the organisation of short programs, participants highlighted the specificities of schedules and work methods. Most kindergartens conduct short programmes in the afternoon, 2 to 4 times a week per 4 hours. These programmes are primarily attended by immigrant children, Roma, refugees, while educators strive to implement content according to the *Curriculum for Kindergartens* (1999). Group work involves the use of translators, dictionaries, and the preparation of language materials, as children often do not know the language and have difficulties with graphomotor skills. A good practice includes the use of various aids, online resources, and libraries. Participants also cited the implementation of short programmes at school as a good practice example, allowing children to familiarise themselves with the school environment before enrolling in primary school. Proper collaboration between the relevant kindergarten and school is also important in terms of gathering data about children eligible for the short programme.

Educators and other members of professional staff believe that 240 hours of the short programme is insufficient for children to acquire and develop language competencies and achieve developmental goals in the early period of their lives. Irregular attendance of children in the short programme (30–40%) also poses a significant challenge to educators. To ensure attendance, one kindergarten that implemented the short program arranged organised transportation, achieving 90% attendance.

Results of kindergarten focus groups regarding reducing social, cultural, and economic inequalities

Both good practices and challenges were identified in the focus groups consisting of professional kindergarten staff when discussing the reduction of economic, cultural, and social inequalities. Good practices include a variety of activities, such as visits to external institutions (puppet theatre, art gallery, sports clubs, nearby primary schools, etc.), cooperation with Social Work Centres and health centres, dance lessons, nature walks, visits to the city library, accustoming children to daily routines, developing graphomotor skills, joint meetings with parents and children, children's performances, and the use of multilingual picture books. Working with children also involves involving immigrant parents in various activities.

A. T. Jurgec, B. Bednjički Rošer: Characteristics, Challenges, and Proposals for the Improvement of Short Pre-school Education Programmes in Slovenia : Analysis of Focus Groups

85

Table 3: Analysis of focus group representatives from kindergartens regarding reducing inequalities in short programs

Theme	Category	Code
Reducing inequalities (8)	Good practices (3)	Implementation of various activities to reduce inequalities in SP (6)
		Cooperation with other institutions (1)
		In SP with children from Ukraine, one parent is always present (1)
	Challenges (5)	SP does not fully allow for reducing social, cultural and economic differences (1)
		Insufficient hours to reduce inequalities (5)
		Parents are not invited to SP activities (1)
		Strengthening contact with parents mainly in regular programmes (1)
		SP does not conduct meetings with parents (3)

Participants reported that, when working with Russian-speaking children, they use texts in the Russian language. To overcome language barriers, educators are occasionally assisted by siblings of the children who are already enrolled in primary school.

Despite the efforts of professional workers, the main challenge remains the lack of time, as 240 hours is insufficient to effectively address the problem of inequality. Professional workers highlight that there are inequalities in children's language development, socialisation, and other areas of development.

Additionally, professional staff pointed out that short programmes often do not include the conduct of additional activities with parents as the lack of time for anything else only allows for primarily focusing on working with children. Professional staff believes that the short programme only partially enables the reduction of inequalities.

Results of kindergarten focus groups with kindergartens regarding the added value of mandatory inclusion of children in pre-school education programmes

Responses in two categories – challenges and proposals – were found when analysing the added value of the potential introduction of a mandatory pre-school education programme. Kindergarten professionals face problems as a result of the

current short programme not being mandatory, leading to irregular attendance of children and lack of parental responsibility. Organising short programs at the system level presents an additional challenge, as kindergartens experience spatial and staffing constraints and lack adequate support from kindergarten founders (municipalities). An additional challenge specific to certain areas in Slovenia is that only Roma children are directed by kindergartens to short programmes, constituting a form of segregation. This finding is certainly concerning from both a professional and legal standpoint. Kindergarten professionals provided several design proposals for a potential new programme or improvement proposals for existing programmes. All agree that the duration of the short programmes currently co-financed by the Ministry of Education is too short, as continuity in the pre-school period is essential. They also suggested that the short programme should be mandatory for all children who had not participated in regular kindergarten programmes before starting school. They believe the programme should last throughout the school year in a condensed form in the morning. They highlighted the positive effects of a mandatory and longer short programme, mainly reflected in children's progress in individual developmental areas and knowledge. All participants acknowledge that systemic changes and organisation are necessary.

Table 4: Analysis of kindergarten focus group representatives regarding the added value of the mandatory pre-school education programme

Theme	Category	Code
Added value of the mandatory programme (11)	Challenges (4)	Challenge that SP is not mandatory (3)
		Challenge of staff overload (2)
		Need for system-level organisation (3)
		The current SP focuses only on Roma (1)
	Proposals (7)	SP as a mandatory form should last the entire year (5)
		Mandatory SP should not be in the afternoon (1)
		Noticeable progress in children in SP (1)
		Need for system-level organisation (3)
		The programme should be longer than 240 hours (3)
		A condensed form of SP is sensible (6)
		More time is needed for added value in various areas (4)

A. T. Jurgec, B. Bednjički Rošer: Characteristics, Challenges, and Proposals for the Improvement of Short Pre-school Education Programmes in Slovenia : Analysis of Focus Groups

87

Results of kindergarten focus groups regarding new programme design proposals

Table 5: Analysis of kindergarten focus group representatives regarding new programme design proposals

Theme	Category	Code
New programme design proposals (14)	Needs (5)	Need for Roma translators and other staff (1)
		Need for Roma educators (1)
		Need for various SPs (4)
		Planning transitions from SP into regular programmes (3)
		Need for multilingual materials for SP (1)
	Proposals (9)	SP should last the whole year before school (4 hours) (1)
		SP should be mandatory (4)
		SP should be for children aged 3-6 (2)
		Departments should be homogeneous (2)
		Inclusion of younger siblings in SP is important (1)
		Need for various SPs (4)
		The programme should be free-of-charge (2)
		The programme should last more than 240 hours (1)
		Challenges with including younger siblings (2)

The analysed responses of kindergarten focus group participants regarding new programme design proposals were classified into two key categories: needs and proposals. The responses highlight the need for various short programmes, with some professionals proposing separation of programmes based on the origin of children (Ukraine, Roma, refugees) and Slovenian children. They propose specialised short programs for specific groups, including special staff such as Roma assistants, translators, and interpreters. They also emphasized the need for planning transitions from short into regular programmes, focusing on integrating children into regular programmes after completing the short one. Educators expressed a desire for multilingual brochures explaining the pre-school education system to parents. Regarding proposals for a new programme, the idea that a new programme or some form of a short programme should be mandatory for all children stands out. Again, the desire for offering different types of short programmes tailored to specific child populations is highlighted. Proposals also include demands for homogeneous departments, programmes for children in the second age group, duration of more than 240 hours, and a year-long programme before entering school. However, opinions are divided on the inclusion of younger children (siblings). Some see this

as increasing parental trust, while others believe it complicates work and that younger children cannot keep up with the activities.

Results of kindergarten focus groups with kindergartens regarding the needs for further education and training

Table 6: Analysis of kindergarten focus groups regarding further education and training

Theme	Category	Code
Further Education and Training (8)	Needs (5)	Networking need of SP implementers (1)
		Competence development proposal for staff involved in SP (1)
		Need for exchange of good practices in SP (1)
		Lack of training providers (1)
		Kindergarten organises its own training (1)
	Proposals (3)	Need for more information about SP (1)
		Proposed content for additional training (6)
		Examples of good didactic materials for learning Slovenian (1)

Kindergarten professionals highlighted various needs for further education and training. Among the most common proposals are the needs for additional education in "Slovenian as a second or foreign language" and training for planning and implementing language activities in short programme groups attended by children with different mother tongues. Professionals emphasize the need for language training for working with immigrant children. In addition, they express a need for developing competencies in "approaches to teaching immigrants, Roma" and "cooperation with parents" due to the diversity of family values and cultures. They also mention the need for networking among short programme implementers in Slovenia and the exchange of good practices, which would help overcome professional challenges. Implementers of short programmes also express a need for multilingual didactic materials for pre-school children, which are rarely available in our area. They particularly emphasised the importance of multilingual picture books as an excellent resource for literacy development and language learning in linguistically disadvantageous circumstances. Picture books were also used to encourage communication between children and their parents in the mother and/or foreign language.

A. T. Jurgec, B. Bednjički Rošer: Characteristics, Challenges, and Proposals for the Improvement of Short Pre-school Education Programmes in Slovenia : Analysis of Focus Groups

89

4   Discussion

The research based on focus groups of professional kindergarten staff revealed numerous challenges in and characteristics of implementing short pre-school education programmes. The most common challenges highlighted by kindergarten professionals were issues related to space or spatial limitations. Suitable material work conditions, especially regarding space, equipment, materials, tools, etc., are essential for the implementation of a quality educational process, as they affect the educational process and consequently the child's development and achievements (Batistič Zorec, 2011). Numerous authors also emphasize the importance of appropriate space and equipment in the earliest periods (Baran et al., 2007; Leinonen and Venninen, 2012), as a quality learning environment supports children's activities and promotes quality learning (Mohidin et al., 2015; Yang et al., 2018).

Staffing challenges also constitute a significant factor affecting the quality of the implementation of short programmes. Kindergarten professionals pointed out a shortage of staff, leading to additional burdens on staff conducting the short programme after their regular schedule in the full-day programme. Therefore, most kindergartens conduct short programmes in the afternoon, 2 to 4 times a week for four hours. The short programme groups mainly include immigrant children, Roma, refugees, and a few Slovenian children. Participants in the focus groups highlighted a lack of specialised staff. Despite recommendations (Cotič Pajntar and Zore, 2018; Mlekuž, 2022; Vonta, 2013), research in our country shows that educators working with vulnerable groups still need more professional support from the educational environment, more knowledge of methods adapted for children from vulnerable groups, and more cooperation with the parents of these children (Licardo, 2020).

Language barriers also present a significant challenge for educators in short programmes. To stimulate children's vocabulary, educators often use online translators, picture dictionaries and other multilingual materials. Nevertheless, educators strive to implement all areas according to the Curriculum for Kindergartens (1999). Good practices include using various aids, online resources, libraries, and exchanging experience among educators. In addition, kindergarten professionals strive to reduce economic, cultural, and social inequalities, but 240 hours, the current duration of the short programme, is not enough to address this issue. Participants highlight inequalities in children's language development,

socialisation, and other development areas, indicating the limitations of short programmes in reducing inequalities.

The analysis of proposed changes in pre-school education programs reveals the need for more mandatory short programmes, tailored to specific groups of children. Research from abroad shows that, for children from less stimulating family environments, it is important to be included in high-quality kindergarten at a younger age, which can act as a protective factor, e.g., in speech development, school readiness, and later academic success (Burchinal et al., 2000; Gormley et al. 2005; Loeb et al., 2004; Magnuson et al., 2006).

Kindergarten professionals have suggested the need for a wider range of shorter programmes, including specialised shorter programmes for specific groups of foreign-speaking children. This finding is concerning, as it implies that some professionals advocate for segregating children into short programme groups based on ethnic, national, and/or linguistic affiliation. This is professionally unacceptable and also encroaches on the legal aspect of children's rights.

Participants in the focus groups proposed that departments should be homogeneous, the programme should be for children in the second age group, last more than 240 hours, and be year-long before school entry.

Participants expressed a need for further education, especially regarding Slovene as a second or foreign language and planning and implementing language activities in short programme units with children of different languages. They also highlighted the need to develop competencies for teaching immigrants, Roma, and cooperation with parents to better understand the family values and cultures of children in short programmes, including intercultural education and the principle of multiculturalism.

5   Conclusion

Quality pre-school education contributes to effective learning, social development, and the acquisition of fundamental skills that enable children to successfully and independently enter the school environment. Kindergartens in Slovenia offer various preschool education programmes that differ in duration and organisation; full-day, half-day, and short programmes.

Our study provides valuable insights into the characteristics of short programs' implementation from the perspectives of experience, challenges, proposals, and needs highlighted by kindergarten professionals who implemented short programs in the previous school years. Spatial limitations, staff shortages, and language barriers are key challenges found as faced by kindergarten professionals who highlighted the need for additional training in language activities, intercultural education, and parent cooperation, as these programmes primarily include children from vulnerable groups. Improvement proposals include a greater diversity of programs, homogeneous units, and extending the duration of programmes.

Our findings constitute an important basis for designing improvements at the implementation and systemic levels. The push to make a shorter programme compulsory for all children who are not enrolled in other forms of pre-primary education in the year before they start school reflects the need for systemic change. The programme should provide systemic support for families, including linguistic support (such as learning Slovene as a second language), and be significantly more than 240 hours. Systemic change could form the foundation leading to the quality implementation of short programmes. Consideration should also be given to planning transitions from short programs into regular programmes, with an emphasis on integrating children into regular programmes after completing the short one. Future research could focus to the research of development of additional strategies to address the identified challenges.

It is crucial to understand that including children in high quality pre-school education programmes is a fundamental step towards ensuring equal opportunities for all children and reduction social, economic, and cultural inequalities. Therefore, efforts should be made in the Republic of Slovenia to increase the participation levels of children in pre-school education programmes, with special attention being paid to including children from vulnerable groups therein.

References

Ansari, A. (2018). The persistence of preschool effects from early childhood through adolescence. *Journal of Educational Psychology, 110*(7), 952–973. https://doi.org/10.1037/edu0000255

Ansari, A., Pivnick, L. K., Gershoff, E. T., Crosnoe, R., in Orozco-Lapray, D. (2018). What do parents want from preschool? Perspectives of low-income Lation/a immigrant families. *Early Childhood Research Quarterly*, 52(3), 38–48. https://doi.org/10.1016/j.ecresq.2018.08.007

Batistič Zorec, M. (2011). *Kakovost vrtcev: uporabnost, dileme in kritike koncepta kakovosti*. Ljubljana: Pedagoška fakulteta.

Baran, M., Yilmaz, A. And Lightning, M. (2007). The Importance of Pre-School Education and User Requirements in Pre-School Education Structures Example of Diyarbakir huzurevler Kindergarten. D. U. Ziya Gökalp *Journal of Education*, 8, 27–44.

Bednjički Rošer, B. (2021). Spodbujanje jezikovnih kompetenc in medkulturne zmožnosti predšolskih otrok. V D. Haramija in S. Pulko (ur.), *Pogledi na slovenščino kot neprvi jezik v zgodnjem izobraževanju* (pp. 115–134). Maribor: Univerza v Mariboru, Univerzitetna založba.

Blau, D. M. (2021). The Effects of Universal Preschool on Child and Adult Outcomes: A Review of Recent Evidence from Europe with Implications for the United States. *Early Childhood Research Quarterly,* 55, 52–63. https://doi.org/10.1016/j.ecresq.2020.10.009

Burchinal, M. R., Peisner-Feinberg, E., Bryant, D. M., & Clifford, R. (2000). Children's social and cognitive development and child-care quality: Testing for differential associations related to poverty, gender, or ethnicity. *Applied Developmental Science*, *4*(3), 149–165.

Cotič Pajntar, J. in Zore, N. (2018). Priporočila za izvajanje krajših programov. Ljubljana: Zavod Republike Slovenije za šolstvo. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Sektor-za-predsolsko-vzgojo/Programi/Krajsi_programi_v_vrtcu_priporocila13julij2018.pdf

Ginner Hau, H., Selenius, H. & Björck Åkesson, E. (2022). A preschool for all children? – Swedish preschool teachers' perspective on inclusion. *International Journal of Inclusive Education*, 26(10), 973–991. https://doi.org/10.1080/13603116.2020.1758805

Gormley Jr, W. T., Gayer, T., Phillips, D. & Dawson, B. (2005). The effects of universal pre-K on cognitive development. *Developmental psychology*, *41*(6), 872.

Hlastan-Ribič, C., Maučec Zakotnik, J., Koroušić Seljak, B. in Pokorn, D. (2008). Praktikum jedilnikov zdravega prehranjevanja v vzgojno-izobraževalnih ustanovah (od prvega leta starosti naprej). Ljubljana: Ministrstvo za zdravje, Zavod Republike Slovenije za šolstvo. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Sektor-za-predsolsko-vzgojo/Dokumenti-smernice/ZRSS_Praktikum.pdf

Kurikulum za vrtce: predšolska vzgoja v vrtcih (1999). Ljubljana: Ministrstvo za šolstvo in šport, Zavod Republike Slovenije za šolstvo.

Leinonen, J. & Venninen, T. (2012). Designing learning experiences together with children. *Procedia-Social and Behavioral Sciences,* (ajE-Bs) 45, 466–474. https://doi.org/10.1016/j.sbspro.2012.06.583

Licardo, M., Laure, M., Ograjšek, S., Mithans, M., Jurgec, A. T., Kranjec, E., Kozjek Varl, K., Bednjički Rošer, B. in Sraka Petek B. (2023). *Nacional evaluation study: Analysis of the needs, conditions and possibilities of compulsory inclusion of Children in one of the preschool education programmes from the perspective of reducing social, economicand cultural inequalities.* University of Maribor, Faculty of Education.

Licardo, M. in Oliveira Leite, L. (2022). Collaboration with immigrant parents in early childhood education in Slovenia: How important are environmental conditions and skills of teachers?, Cogent Education, 9:1, DOI: 10.1080/2331186X.2022.2034392

Licardo, M. (2020). Implementing good practices with migrant children in preschool education in Slovenia. V R. Kissne Zsamboki (ur.), *Clicked: culture, language, inclusion, competencies, knowledge,*

education: diverse approaches and national perspectives in the field of primary and pre-primary education (pp. 57–68). Sopron: University Press, University of Sopron.

Licardo, M. in Oliveira Leite, L. (2021). Ecological conditions and interpersonal skills leading to ECE teacher competences in working with immigrant children in Slovenia, European Early Childhood Education Research Journal, 30:3, 388–402.
DOI: 10.1080/1350293X.2021.1980597

Loeb, S., Fuller, B., Kagan, S. L. & Carrol, B. (2004). Child care in poor communities: Early learning effects of type, quality, and stability. *Child development*, *75*(1), 47–65.
https://doi.org/10.1111/j.1467-8624.2004.00653.x

Lynch, M. A. (2004). Long-term potentiation and memory. *Physiological reviews*, *84*(1), 87–136.

Magnuson, K., Lahaie, C. & Waldfogel, J. (2006). Preschool and school readiness of children of immigrants. *Social science quarterly*, *87*(5), 1241–1262. https://doi.org/10.1111/j.1540-6237.2006.00426.x

Marjanovič Umek, L. (2014). Strukturna kakovost vrtca: učinek na procesno kakovost in dosežke otrok. *Sodobna pedagogika, 65(2),* 10–22.

Mlekuž, A. (2022). *Slovenija v mednarodnem merilu: prehod iz vrtca v šolo: OECD-jev pregled politik in praks izobraževalnih sistemov na področju prehoda otrok iz vrtca v šolo: Slovenija v mednarodnem merilu.* Ljubljana: Ministrstvo Republike Slovenije za izobraževanje, znanost in šport: Zavod RS za šolstvo. https://www.dlib.si/details/URN:NBN:SI:DOC-PKPJ92AY

Mohidin, H. H. B., Ismail, A. S., Ramli, H. B. (2015). Effectiveness of Kindergarten Design in Malaysia. Procedia - Social and Behavioral Sciences 202, 47–57.
https://doi.org/10.1016/j.sbspro.2015.08.207

Morgan, H. (2019). Does High-Quality Preschool Benefit Children? What the Research Shows. *Education Sciences*, 9(1). https://doi.org/10.3390/educsci9010019

Pravilnik o organiziranju, delovanju in financiranju oddelkov vrtcev, ki izvajajo krajše programe in so financirani iz državnega proračuna (2018). Uradni list RS, št. 43. https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2018-01-2132/pravilnik-o-organiziranju-delovanju-in-financiranju-oddelkov-vrtcev-ki-izvajajo-krajse-programe-in-so-financirani-iz-drzavnega-proracuna

Rutar, S. (2018). Kakovost šole s perspektive učencev s priseljensko izkušnjo kot izhodišče za zagotavljanje inkluzivnega izobraževanja. *Dve Domovini*, (48).
https://doi.org/10.3986/dd.v0i48.7131

Van der Gaag, J. (2002). From Child Development to Human Development. V M. Eming Young, From Early Child Development to Human Development (pp. 63–78).
http://www.sck.gov.tr/wp-content/uploads/2020/02/From-Early-Child-Development-to-Human-Development.pdf

Vonta, T. (2009). Organizirana predšolska vzgoja v izzivih družbenih sprememb. Ljubljana: Pedagoški inštitut. https://www.pei.si/ISBN/978-961-270-026-3.pdf

Yang, B., Olofsson, T., Wang, F. & Lu W. (2018). Thermal comfort in primary school classrooms: A case study under subarctic climate area of Sweden. Building and Environment 135, 237–245.
https://doi.org/10.1016/j. buildenv.2016.11.020

TEACHER SELF-EFFICACY: DIFFERENCES BASED ON WORKPLACE AND WORK EXPERIENCE

IRENA KLASNIĆ, TOMISLAVA VIDIĆ, MARINA ĐURANOVIĆ
University of Zagreb Faculty of Teacher Education, Zagreb, Croatia
irena.klasnic@ufzg.hr, tomislava.vidic@ufzg.hr, marina.duranovic@ufzg.hr

The purpose of this research was to explore to what extent primary school teachers are aware of their self-efficacy, to determine if there are differences in the perceptions of self-efficacy between classroom teachers and subject teachers, and to determine the significance of the years of work experience. The research was carried out on a sample consisting of 761 teachers working in primary schools in the Republic of Croatia. In the first part of the survey, data on the basic sociodemographic characteristics of the participants were collected, while the second part of the survey was designed to collect data on the perceived teacher self-efficacy, using the shortened version of *The Teacher Sense of Teacher Efficacy Scale* (Tschannen-Moran & Woolfolk Hoy, 2001). The obtained results indicate statistically significant differences in teacher self-efficacy related to their workplace, while statistically significant differences in terms of work experience were not found.

University of Maribor Press

Samoučinkovitost učiteljev: Razlike glede na delovno mesto in delovne izkušnje

Irena Klasnić, Tomislava Vidić, Marina Đuranović
Univerza v Zagrebu, Pedagoška fakulteta, Zagreb, Hrvaška
irena.klasnic@ufzg.hr, tomislava.vidic@ufzg.hr, marina.duranovic@ufzg.hr

Z raziskavo smo želeli preveriti, v kolikšni meri osnovnošolski učitelji zaznavajo lastno samoučinkovitost in ali obstajajo razlike v zaznavi samoučinkovitosti med razrednimi in predmetnimi učitelji, torej glede na leta delovnih izkušenj. V raziskavi je sodelovalo 761 učiteljev, zaposlenih v osnovnih šolah v Republiki Hrvaški. V prvem delu vprašalnika so bili zbrani podatki o osnovnih socio-demografskih značilnostih udeležencev, v drugem delu pa podatki o zaznani samoučinkovitosti učiteljev s pomočjo lestvice *Teacher sense of teacher efficacy scale* (Tschannen-Moran & Woolfolk Hoy, 2001). Pridobljeni rezultati kažejo, da obstajajo statistično značilne razlike v samoučinkovitosti učiteljev glede na delovno mesto, medtem ko statistično značilne razlike glede na delovne izkušnje niso ugotovljene

1   Introduction

Self-efficacy is a concept developed by Albert Bandura within his Social Cognitive Theory (Bandura, 1986). Bandura (1977; 1997) defined self-efficacy as a person's belief in their own abilities of organizing and carrying out certain activities and procedures necessary to achieve the set goals. An individual's belief in their self-efficacy influences and regulates their thoughts, feelings and behaviour, and have an impact on their motivation. There are four factors which account for an individual's belief in their self-efficacy: mastery experiences (a person's memories of success in similar tasks in the past), vicarious experiences (listening to/observing other people's achievements), verbal persuasion (assessment or feedback received from other people), and physiological and affective states (interpreting information received through one's own senses). A high level of an individual's beliefs in their self-efficacy helps them face the challenges and remain committed to their goals, while a low level has the opposite effect, i.e., it encourages avoidance and negative feelings which can have a detrimental effect not only on their performance, but also on their well-being (Waddington, 2023). Bandura (2006) pointed out that self-efficacy can be seen as a multidimensional construct and the most important mechanism of human activity, as it provides us with an opportunity to have a direct impact on someone's functioning and living circumstances. Apart from that, one's beliefs in their self-efficacy might be taken as a significant predictor of a person's behaviour (Bandura, 1997).

1.1   Teacher self-efficacy

The significance and impact of self-efficacy as a concept have been frequent research topics in almost all areas of human work and activity, including the teaching profession. Numerous factors contribute to the quality of education, but the teachers have the crucial role (Raymond and Gabriel, 2023). In research carried out on the impact of teachers on students' studying and learning process, more focus has been put on teachers' beliefs in their own competencies and self-efficiency (Hassan and Akbar, 2019; Lauermann and ten Hagen, 2021; Shahzad and Naureen, 2017; Zee and Koomen, 2016).

Teacher self-efficacy can be defined as teachers' beliefs in their own ability to provide learning support in various cognitive, affective, and social ways, depending on the set task and context (Wyatt, 2010). Dellinger et al. (2008) describe self-efficacy

as an individual belief of a teacher in his/her ability to teach successfully in a particular situation. Chesnut and Cullen (2014) believe that teacher self-efficacy reflects teachers' belief in how much they are able to achieve specific teaching goals. Teachers who have a high level of self-efficacy also tend to have a positive attitude to various situations, potential difficulties, challenges, and problems. They are able to keep their emotions under control, which results in high achievements (Shahzad and Naureen, 2017). Such teachers are more organized and more skilful at giving instructions, asking questions and explaining the teaching material. They are also better at solving academic problems. The strategies they employ help them minimize the negative impacts and create the classroom environment which cultivates warm interpersonal relationships and academic work (Ashton and Webb, 1986). Schwarzer and Hallum (2008) point out that teachers with a high level of self-efficacy invest a lot of effort in improving their students' achievements, set high and challenging goals for themselves and work hard to achieve them.

Numerous and diverse instruments are used to measure teacher self-efficacy, which proves the fact that it is a complex concept (Morris et al., 2017). Researchers tend to analyse teacher self-efficacy from various angles, taking into consideration its various dimensions. Perera et al. (2019) state that teacher self-efficacy on the one hand includes self-perception of personal teaching competencies, while on the other hand it includes judgment about the teaching demands specific to a certain domain and judgment about external limitations and resources. In an attempt to draw attention to numerous aspects from which teacher self-efficacy can be considered, Schwarzer and Hallum (2008) emphasize a range of teaching tasks and situations in the classroom, such as: job accomplishment, skill development on the job, social interaction with students, parents and colleagues and coping with job stress. Bandura (1997) pointed out that teacher self-efficacy encompasses several different tasks which he has to carry out in the classroom: efficacy to influence decision making, efficacy to influence school resources, instructional efficacy, disciplinary efficacy, efficacy to enlist parental involvement, efficacy to enlist community involvement, and efficacy to create a positive school climate. Skaalvik and Skaalvik (2007) believe that teacher self-efficacy comprises several elements, listing the following: self-efficacy in teaching, adjustment of the teaching process to the specific student needs, motivating students, maintaining discipline, cooperation with colleagues and parents, and adapting to changes successfully. Tschannen-Moran and Hoy (2001)

view teacher self-efficacy through three dimensions: efficacy to engage students, efficacy to use various instructional strategies and efficacy to lead the class.

Teacher self-efficacy results in numerous benefits, both for students and for teachers. According to research results, teacher self-efficacy is related to good classroom environment and successful classroom management strategies (Künsting et al., 2016). Furthermore, research indicates a positive relationship between teacher self-efficacy and the quality of the classroom instruction (Klassen and Tze, 2014). There is a greater likelihood that teachers with a higher level of self-efficacy will introduce innovative approaches into their teaching process (Rimm-Kaufman and Sawyer, 2004). Teacher self-efficacy has a great impact on student motivation and their academic achievements (Lauermann and Butler, 2021; Mojavezi and Tamiz, 2012; Shahzad and Naureen, 2017; Zee & Koomen, 2016). Teachers' beliefs in their self-efficacy are positively related to their well-being (Betoret, 2006), job satisfaction (Collie et al., 2012) and emotional intelligence (Moafian & Ghanizadeh, 2009). Teachers with a higher level of self-efficacy have a lower level of burnout (Skaalvik and Skaalvik, 2010), are more committed to their work (Klassen and Chiu, 2011) and are less likely to leave the teaching profession (Brouwers and Tomic, 2000). The grade level in which the teachers implement the teaching process and years of their work experience are some of the contextual factors which are significant social cognitive teacher beliefs about their job (Klassen and Chiu, 2010).

1.1.1 Research aim

The aim of this research was to examine how primary school teachers perceive their self-efficacy and whether there are differences in self-efficacy perceptions between classroom teachers and subject teachers, in terms of the years of work experience in the teaching profession.

1.1.2 Problem and hypotheses

Research problems and hypotheses were formed, in line with the research goals.

1. Examine if there are statistically significant differences in self-efficacy perceptions between classroom teachers and subject teachers.

H1. There is no statistically significant difference in self-efficacy perceptions between classroom teachers and subject teachers.

2. Examine if there are statistically significant differences in self-efficacy between teachers in terms of the years of work experience in the teaching profession.

H2. Teachers with more work experience exhibit a higher level of self-efficacy than teachers with less than 10 years of work experience.

2   Method

2.1   Participants

Table 1: Overview of sociodemographic characteristics of the sample (N = 761)

		N	%
Workplace	Classroom teaching	268	35.2 %
	Subject teaching	493	64.8 %
Education level	College	78	10.2 %
	Higher education	664	87.3 %
	MA/PhD degree	19	2.5 %
Work experience	0 – 10 years	250	32.9 %
	11 – 20 years	274	36.0 %
	21 – 30 years	167	21.9 %
	≥ 31 years	70	9.2 %

The research was carried out on a sample consisting of 767 participants, i.e., teachers employed in primary schools in the Republic of Croatia. Primary school is mandatory in the Republic of Croatia, and it lasts for 8 years. The education process in primary school is divided into two cycles – the first cycle lasts four years (grades 1- 4) and the teaching process is carried out by classroom teachers, while the second cycle also lasts four years (grades 5 – 8), but the teaching process is carried out by subject teachers (The Primary and Secondary School Education Act, 2022). Before processing the obtained data, deviations were checked. Univariate outlier detection resulted in the removal of two participants, while the analysis of Mahanalobis distance resulted in the removal of 4 additional participants, thus reducing the sample of participants to 761. The average age of the participants was 42.7 years (SD = 9.4), while the average number of the years of work experience was 16.4 years (SD

= 9.7). A detailed overview of the demographic characteristics of the sample can be seen in Table 1.

2.2 Procedure

Research was conducted online. The link to the questionnaire was shared in various teachers' groups on social media. In the introductory part of the questionnaire, the participants were informed about the research aim, the anonymity of the collected data and other ethical principles.

2.3 Research instruments

In the first part of the questionnaire, the data on the basic sociodemographic characteristics (gender, age, the county in which the respondents were employed, education level, years of work experience, and workplace) were collected, while in the second part of the questionnaire the data on the perceived teacher self-efficacy were collected.

A shortened version of *The Teacher Sense of Teacher Efficacy Scale* (Tschannen-Moran & Woolfolk Hoy, 2001) was used to measure teacher self-efficacy. A written permission of the authors was obtained for the use of this scale. The original version of the scale contains 12 items which measure three self-efficacy dimensions: efficacy in student engagement (e.g. *How much can you do to motivate students who show low interest in schoolwork?*), efficacy in instructional strategies (e.g. *To what extent can you provide an alternative explanation or example when students are confused?*), and efficacy in classroom management (e.g. *How much can you do to control disruptive behavior in the classroom?*). The respondents provided answers to the questions using a 5-point scale (from *1 – nothing* to *5 – A great deal*). Exploratory factory analysis was performed using the Principal components method with orthogonal (varimax) rotation (KMO = .897; Bartllet's test of sphericity $\chi^2 df66 = 3980.370$; p = .000). A two-factor structure was obtained, explaining 57.38% of the self-efficacy variance. The first factor, which includes the items efficacy in student engagement and efficacy in instructional strategies, has a Cronbach α scale reliability coefficient α = .848, while the Cronbach α scale reliability coefficient of the second factor, efficacy in classroom management, is α = .872.

3   Results

Table 2 contains the basic descriptive parameters of the examined variables before the analyses necessary to obtain the answers to the tasks set in the research were performed. The Kolmogorov-Smirnov test of normality distribution showed that result distributions in all measurements deviate from the normal value. However, as the values of skewness index and kurtosis are not considered extreme according to the criteria listed by Kline (2011), the application of parametric statistics can be considered justified.

Table 2: Descriptive statistics (N = 761)

	M	SD	Skewness	Kurtosis	Min.	Max.
Teacher self–efficacy	4.20	0.41	−0.040	−0.044	2.92	5.00
Efficacy in classroom management	4.26	0.52	−0.239	−0.200	2.50	5.00
Efficacy in student engagement and instructional strategies	4.16	0.44	−0.005	−0.227	2.75	5.00

In order to carry out the first research task and to determine possible differences in the self-efficacy perceptions between teachers in terms of their workplace, a *t-test* was performed. The obtained results are presented in Table 3, and they indicate statistically significant differences in the overall teacher self-efficacy and self-efficacy in engagement and instructional strategies in the group consisting of classroom teachers. However, the calculated Cohen's d index values show that these differences have a low size effect.

Table 3: Differences in perceptions between classroom teachers and subject teachers (N = 761)

	RN (n_{CT}= 268)		PN (n_{ST} = 493)		*t-test*	*p*	Cohen's d
	M	SD	M	SD			
Teacher self–efficacy	4.26	0.43	4.16	0.40	3.333	0.001*	−0.250
Efficacy in classroom management	4.27	0.51	4.26	0.52	0.377	0.707	−0.029
Efficacy in student engagement and instructional strategies	4.26	0.46	4.11	0.42	4.486	0.001*	−0.337

*Note. *p* < .01*

The first hypothesis suggested no statistically significant differences in self-efficacy perceptions between classroom teachers and subject teachers. As statistically significant differences ($t(759) = 3,333$; $p = .001$) in teacher self-efficacy in terms of workplace (classroom teachers or subject teachers) were found, the hypothesis was refuted.

In order to determine differences in self-efficacy perceptions in terms of the years of work experience, a univariate variance analysis ANOVA was performed (Table 4). The participant sample was divided into four groups: ≤ 10 years of work experience ($n = 250$), $11 - 20$ years of work experience ($n = 274$), $21 - 30$ years of work experience ($n = 167$) and more than 31 years of work experience ($n = 70$).

Table 4: Differences in the perceptions of self-efficacy – the results of variance analysis

	Work experience						
	≤ 10	11-20	21-30	≥ 30	F		
Variable	M (SD)	M (SD)	M (SD)	M (SD)	(3, 757)	p	η_P^2
Teacher self–efficacy	4,16 (0.39)	4.17 (0.40)	4.26 (0.41)	4.30 (0.47)	3.746	.011	0.015
Efficacy in classroom management	4.20 (0.20)	4.26 (0.52)	4.34 (0.48)	4.28 (0.57)	2.267	.079	0.009
Efficacy in student engagement and instructional strategies	4,14 (0.44)	4.12 (0.43)	4.22 (0.44)	4.30 (0.46)	4.553	.004	0.018

Note. *p < .05; **p < .01

To avoid a risk of Type I error due to a range of ANOVA tests, the Bonferroni correction was used. It was determined that p value of at least .008 for 5% risk and .002 for 1% risk is considered significant. The results presented in Table 4 indicate that there are no statistically significant differences between the groups of participants.

According to the second hypothesis, the teachers with more years of work experience show greater self-efficacy than teachers with less than 10 years of work experience. As no statistically significant differences were found between the groups of participants, this hypothesis was refuted.

4   Discussion

The purpose of the study was to explore how primary school teachers perceive their own self-efficacy and whether there are differences in the perceived self-efficacy between classroom teachers and subject teachers in terms of the years of work experience in the teaching profession. In this research, teachers gave a relatively high assessment of their own self-efficacy levels ($M = 4.20$, $SD = 0.41$). It has a great importance for instruction, as teachers have reported numerous positive effects of self-efficacy on their work: they believe they have better competencies for working with gifted students and those with developmental difficulties; they are more tolerant of students exhibiting undesirable behaviours; they recognize and accept students' opinions and emotions; they create learning situations in which all students feel well; they use the teaching time more efficiently, etc. (Alibakhshi et al., 2020). Teacher self-efficacy is also reflected in instructional methods and strategies application, in creating encouraging environment for students, and in managing challenging situations in the classroom (Beaman & Wheldall, 2000; Tschannen-Moran & Hoy, 2007). Teacher self-efficacy undoubtedly has a great significance, and this research has highlighted the differences in self-efficacy in terms of workplace and work experience in the teaching profession.

4.1   Teacher self-efficacy and workplace

Regarding the first problem, a difference was found in the perceptions of self-efficacy between the classroom teachers and subject teachers, where classroom teachers seem to have better results. Work performed by classroom teachers and by subject teachers has a lot of specific features. Classroom teachers spend several hours per day with their students, from the day they start school to the day they finish the fourth grade. In that way, the teachers have an opportunity to get to know their students and students' parents well, to create a positive classroom climate, and to establish collaborative and supportive relationships in the class. During this period of four years, students also have an opportunity to connect well with their teacher. The way in which instruction is implemented in subject teaching, where several teachers take turns in teaching the same class in one day, does not provide opportunities for teachers and students to create quality social relationships. Apart from that, students in grades from 5 to 8 are aged between 11 and 15 years, which means they have entered the adolescent age, when they oppose to authority in

general (teachers being one type of authority). Classroom teachers might have given higher assessment of their self-efficacy level because they work with younger students, who tend to have better academic achievements and are more motivated. It aids teachers in creating a positive classroom climate and helps them reduce the number of challenges and problems. As students' opinions were not collected, this remains only an assumption which should be explored in the future research. Apart from that, classroom teachers take more courses in pedagogy, didactics, psychology and methodology during their studies than subject teachers. The knowledge they have gained in these courses is a good foundation for their professional work and could account for their greater beliefs in their self-efficacy.

The results obtained in the research are in line with the results of other similar studies. Based on the meta-analysis conducted on 165 papers published throughout 40 years of research into self-efficacy, Zee and Koomen (2016) claim that teacher self-efficacy is more significant for primary school students than for secondary school students, as they spend relatively more time with one teacher than students in secondary school. Therefore, teacher self-efficacy does not have as much impact on older students. Fives and Buehl (2009) also carried out research ($N = 372$) in which they found that teachers who work in primary school tend to report significantly higher levels of self-efficacy than teachers who work in secondary schools. Classroom teachers have reported a greater level of self-efficacy in classroom management and student engagement, in comparison with subject teachers (Klassen and Chiu, 2010; Wolters and Daugherty, 2007).

4.2   Teacher self-efficacy and work experience

Our research results indicate that teachers perceive a greater level of their own self-efficacy as their work experience increases, but the differences are not statistically significant. In terms of dimensions, efficacy in classroom management increases as work experience increases, but teachers with more than 30 years of work experience perceive themselves as less self-efficient than teachers with 21 to 30 years of work experience. The obtained results could be ascribed to fatigue before retirement. As far as self-efficacy in teaching engagement and strategies is concerned, the results generally suggest that teachers with up to 20 years of work experience perceive themselves as less self-efficient than teachers with more than 20 years of work experience. These findings might suggest that in order for teachers to feel they have

all the necessary didactic and methodological competences and confidence in the quality of their own work, they need to spend a longer amount of time working in the teaching profession. Although differences in dimensions were determined between the groups of participants in terms of the years of work experience, they are not statistically significant. In spite of that, the determined differences might be taken only as assumptions, so additional research is necessary to gain a deeper insight.

Previous research has not yielded consistent results about differences in teachers' perceptions of their own self-efficacy at various stages of their work experience. Research results obtained by Pas et al. (2012) show that work experience does not have any impact on teacher self-efficacy. On the contrary, a large portion of research has shown that there are differences in teachers' perceptions of their own self-efficacy in terms of the years of work experience. According to research results, teacher self-efficacy is influenced by age and work experience, so older and more experienced teachers had higher assessments of their own self-efficacy level (Chester and Beaudin, 1996; Fackler and Malmberg, 2016; Fives and Buehl, 2009; Woolfolk Hoy & Spero, 2005; Wolters and Daugherty, 2007). In research conducted in Canada (N = 1430), Klassen and Chiu (2010) found that teacher self-efficacy is influenced by long work experience in a nonlinear relationship, and that self-efficacy increases as work experience increases in early and middle stages of the teaching career, while it decreases in the late stage of the teaching career. Furthermore, in their research on teacher self-efficacy in instruction, student engagement and classroom management on a sample of teachers with more and less than 15 years of work experience, Gkolia et al. (2016) found that teachers with shorter work experience reported a lower level of self-efficacy in classroom management, while no differences were found in the other two dimensions.

5   Conclusions

A vast body of research supports the claim that self-efficacy and belief in self-efficacy are important for achievements in various domains of human activity, including education. Teacher self-efficacy depends on various psychosocial and contextual factors, and it is often related to many benefits for students and teachers. Teacher self-efficacy has direct and indirect consequences for various levels of classroom ecology (Zee and Koomen, 2016).

Research results have shown that teachers' perceptions of their own self-efficacy vary according to their workplace and years of work experience, where statistically significant differences were found in terms of workplace, while differences in terms of years of work experience do not have any statistical significance. Classroom teachers tend to perceive themselves as more self-efficient than subject teachers, which is in line with the results of previous body of research. In terms of work experience, the results indicate that teachers with up to 20 years of work experience give a lower assessment of their self-efficacy level than teachers with more than 20 years of work experience in the teaching profession.

This research might have practical implications for all teachers, especially subject teachers. Understanding the importance of self-efficacy in professional work is crucial to quality instruction implementation in which both students and teachers have achieved their maximum. Teacher study programmes should be modernized by introducing new courses that would promote teachers' beliefs in their own self-efficacy. In addition, it would be possible to strengthen the beliefs of students and teachers and advance their professional development using the model of reflective practice, even during studies and internship.

A limitation of this research is the usage of a self-assessment scale, so the obtained results rely on the subjective perceptions of the research participants. The applied quantitative approach might be insufficient for research on the self-efficacy phenomenon. In order to analyse its multi-layered structure, an interpretative research paradigm should be applied, so further research in this direction would be recommended. Future research should take into account additional variables, such as education level, gender, promotion of teachers to higher ranks and participation in various forms of continuous professional development.

References

Alibakhshi, G., Nikdel, F., & Labbafi, A. (2020). Exploring the consequences of teachers' self-efficacy: a case of teachers of English as a foreign language. *Asian-Pacific Journal of Second and Foreign Language Education*, *5*(23), 1-19. https://doi.org/10.1186/s40862-020-00102-1

Ashton, P. T., & Webb, R. B. (1986). *Making a Difference: Teachers' Sense of Efficacy and Student Achievement*. Longman.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory.* Englewood Cliffs, Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W. H. Freeman and Co.

Bandura, A. (2006). Adolescent development from an agentic perspective. In F. Pajares, & T. Urdan (Eds.), *Self-Efficacy Beliefs of Adolescents* (pp. 1-43). Information Age Publishing.

Beaman, R., & Wheldall, K. (2000). Teachers' use of approval and disapproval in the classroom. *Educational Psychology, 20*(4), 431–446. https://doi.org/10.1080/713663753

Betoret, F. D. (2006). Stressors, self-efficacy, coping resources, and burnout among secondary school teachers in Spain. *Educational Psychology: An International Journal of Experimental Educational Psychology, 26*, 519-539. http://dx.doi.org/10.1080/01443410500342492

Brouwers, A., & Tomic, W. (2000). A longitudinal study of teacher burnout and perceived self-efficacy in classroom management. *Teaching and Teacher Education, 16*, 239-253. http://dx.doi.org/10.1016/S0742-051X(99)00057-8

Chesnut, S. R., & Cullen, T. A. (2014). Effects of self-efficacy, emotional intelligence, and perceptions of future work environment on preservice teacher commitment. *The Teacher Educator, 49*(2), 116–132. https://doi.org/10.1080/08878730.2014.887168

Chester, M. D., & Beaudin, B. Q. (1996). Efficacy beliefs of newly hired teachers in urban schools. *American Educational Research Journal, 33*, 233-257. http://dx.doi.org/10.3102/00028312033001233

Collie, R. J., Shapka, J. D., & Perry, N. E. (2012). School climate and social-emotional learning: predicting teacher stress, job satisfaction, and teaching efficacy. *Journal of Educational Psychology, 104*, 1189-1204. http://dx.doi.org/10.1037/a0029356

Dellinger, A. B., Bobbett, J. J., Olivier, D. F., & Ellett, C. D. (2008). Measuring teachers' self-efficacy beliefs: Development and use of the TEBS-Self. *Teaching and Teacher Education, 24*(3), 751–766. https://doi.org/10.1016/j.tate.2007.02.010

Fackler, S., & Malmberg, L. E. (2016). Teachers' self-efficacy in 14 OECD countries: teacher, student group, school and leadership effects. *Teaching and Teacher Education, 56*, 185–195. https://doi.org/10.1016/j.tate.2016.03.002

Fives, H., & Buehl, M. M. (2009). Examining the factor structure of the teachers' sense of efficacy scale. *The Journal of Experimental Education, 78*(1), 118–134. https://doi.org/10.1080/00220970903224461

Gkolia, A., Dimitrios, B. A., & Koustelios, A. (2016). Background characteristics as predictors of Greek teachers' self-efficacy. *International Journal of Educational Management, 30*(3), 460–472. https://doi.org/10.1108/IJEM-03-2014-0040.

Hassan, M. U. & Akbar, R. A. (2019). Effect of teachers' self-efficacy on students' academic achievements: Case of male public sector secondary schools. *Journal of Research in Social Sciences, 7*(2), 58–68. https://doi.org/10.52015/jrss.7i2.78

Klassen, R. M., & Chiu, M. M. (2011). The occupational commitment and intention to quit of practicing and pre-service teachers: Influence of self-efficacy, job stress, and teaching context. *Contemporary Educational Psychology, 36*(2), 114–129. https://doi.org/10.1016/j.cedpsych.2011.01.002

Klassen, R. M., & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology, 102*(3), 741-756. https://doi.org/10.1037/a0019237

Klassen, R. M., & Tze, V. M. (2014). Teachers' self-efficacy, personality, and teaching effectiveness: A meta-analysis. *Educational Research Review, 12*, 59-76. https://doi.org/10.1016/j.edurev.2014.06.001

Kline, R. (2011). *Principles and practice of structural equation modeling.* The Guilford Press.

Künsting, J., Neuber, V., & Lipowsky, F. (2016). Teacher self-efficacy as a long-term predictor of instructional quality in the classroom. *European Journal of Psychology of Education, 31*, 299–322. https://doi.org/10.1007/s10212-015-0272-7

Lauermann, F., & Butler, R. (2021). The elusive links between teachers' teaching-related emotions, motivations, and self-regulation and students' educational outcomes. *Educational Psychologist, 56*(4), 243–249. https://doi.org/10.1080/00461520.2021.1991800

Lauermann, F., & ten Hagen, I. (2021). Do teachers' perceived teaching competence and self-efficacy affect students' academic outcomes? A closer look at student-reported classroom processes and outcomes. *Educational Psychologist, 56*(4), 265–282. https://doi.org/10.1080/00461520.2021.1991355

Moafian, F., & Ghanizadeh, A. (2009). The relationship between Iranian EFL teachers' emotional intelligence and their self-efficacy in language institutes. *System, 37*(4), 708–718. https://doi.org/10.1016/j.system.2009.09.014

Mojavezi, A., & Tamiz, M. P. (2012). The impact of teacher self-efficacy on the students' motivation and achievement. *Theory and Practice in Language Studies, 2*, 483-491. https://doi.org/10.4304/tpls.2.3.483-491

Morris, D. B., Usher, E. L., & Chen, J. A. (2017). Reconceptualizing the sources of teaching self-efficacy: A critical review of emerging literature. *Educational Psychology Review, 29*(4), 795–833. https://doi.org/10.1007/s10648-016-9378-y

Raymond, S., & Gabriel, F. (2023). An ecological framework for early years teacher self-efficacy development. *Teaching and Teacher Education, 132*, Article 104252. https://doi.org/10.1016/j.tate.2023.104252

Pas, E. T., Bradshaw, C. P., & Hershfeldt, P. A. (2012). Teacher- and school-level predictors of teacher efficacy and burnout: Identifying potential areas for support. *Journal of School Psychology, 50*(1), 129-145. https://doi.org/10.1016/j.jsp.2011.07.003

Perera, H. N., Calkins, C., & Part, R. (2019). Teacher self-efficacy profiles: Determinants, outcomes, and generalizability across teaching level. *Contemporary Educational Psychology, 58*, 186–203. https://doi.org/10.1016/j.cedpsych.2019.02.006

Rimm-Kaufman, S. E., & Sawyer, B. E. (2004). Primary-grade teachers' self-efficacy beliefs, attitudes toward teaching and discipline and teaching practice priorities in relation to the "Responsive Classroom" approach. *The Elementary School Journal, 104*, 321-341. https://doi.org/10.1086/499756

Schwarzer, R., & Hallum, S. (2008). Perceived teacher self-efficacy as a predictor of job stress and burnout. *Applied Psychology: An International Review, 57*(Suppl. 1), 152–171. https://doi.org/10.1111/j.1464-0597.2008.00359.x

Shahzad, K., & Naureen, S. (2017). Impact of teacher self-efficacy on secondary school students' academic achievement. *Journal of Education and Educational Development,* 4(1), 48-72. https://files.eric.ed.gov/fulltext/EJ1161518.pdf

Skaalvik, E. M., & Skaalvik, S. (2007). Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout. *Journal of Educational Psychology, 99*(3), 611–625. https://doi.org/10.1037/0022-0663.99.3.611

Skaalvik, E. M., & Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. *Teaching and Teacher Education, 26*, 1059-1069. http://dx.doi.org/10.1016/j.tate.2009.11.001

The Primary and Secondary School Education Act (2022). *[Zakon o odgoju i obrazovanju u osnovnoj i srednjoj školi*]. Hrvatski sabor. https://narodne-novine.nn.hr/clanci/sluzbeni/2008_07_87_2789.html

Tschannen-Moran, M., & Woolfolk Hoy, A. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education, 23*(6), 944–956. https://doi.org/10.1016/j.tate.2006.05.003

Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17*, 783-805. http://dx.doi.org/10.1016/S0742-051X(01)00036-1

Waddington, J. (2023). Self-efficacy. *ELT Journal*, 77(2), 237-240. https://doi.org/10.1093/elt/ccac046

Wolters, C. A., & Daugherty, S. G. (2007). Goal structures and teachers' sense of efficacy: Their
        relation and association to teaching experience and academic level. *Journal of Educational
        Psychology, 99*, 181–193. http://dx.doi.org/10.1037/0022-0663.99.1.181

Woolfolk Hoy, A., & Spero, R. B. (2005). Changes in teacher efficacy during the early years of
        teaching: A comparison of four measures. *Teaching and Teacher Education, 21*(4), 343–356.
        https://doi.org/10.1016/j.tate.2005.01.007

Wyatt, M. (2010). An English teacher's developing self-efficacy beliefs in using groupwork. *System,
        38*(4), 603-613. https://doi.org/10.1016/j.system.2010.09.012

Zee, M., & Koomen, H. M. Y. (2016). Teacher self-efficacy and its effects on classroom processes,
        student academic adjustment, and teacher well-being: A synthesis of 40 years of
        research. *Review of Educational Research, 86*(4), 981–
        1015. https://doi.org/10.3102/0034654315626801

Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

Maja Hmelak, Larisa Mlakar
University of Maribor, Faculty of Education, Maribor, Slovenia
maja.hmelak@um.si, larisa.mlakar@um.si

In the theoretical part the authors define the professional development of preschool teachers and assistant preschool teachers, their pedagogical work, the role of observations in kindergarten, and especially the principal's professional observations. In their research, they were interested in how professional observations affect the professional development of preschool teachers and assistant preschool teachers. Using a questionnaire, they determined how often professional observations are conducted, how the principal's observations contribute to professional development according to the respondents, and how preschool teachers and assistant preschool teachers perceive professional observations and the subsequent discussions. The obtained data were processed using the SPSS program, and the results were interpreted. It was found that assistant preschool teachers more often perceive these professional observations as an additional psychological, physical, and time burden. However, preschool teachers more often perceive them as a way to transfer good practices, but also as something uncomfortable and stressful.

University of Maribor Press

STROKOVNE HOSPITACIJE RAVNATELJEV IN PROFESIONALNI RAZVOJ VZGOJITELJEV

MAJA HMELAK, LARISA MLAKAR

Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
maja.hmelak@um.si, larisa.mlakar@um.si

Avtorici v teoretičnem delu opredelita profesionalni razvoj vzgojitelja in pomočnika vzgojitelja, njuno pedagoško delo, vlogo hospitacij v vrtcu in še posebej ravnateljeve strokovne hospitacije. V raziskavi ju je zanimalo, kako strokovne hospitacije vplivajo na profesionalni razvoj vzgojitelja in pomočnika vzgojitelja. S pomočjo anketnega vprašalnika sta ugotavljali, kako pogosto se izvajajo strokovne hospitacije, kako ravnateljeve strokovne hospitacije po mnenju anketirancev prispevajo k profesionalnemu razvoju ter kako vzgojitelji in pomočniki vzgojiteljev doživljajo strokovne hospitacije in pogovor, ki sledi po njih. Pridobljene podatke smo obdelali s pomočjo programa SPSS in pridobljene rezultate interpretirali. Ugotovili smo, da pomočniki vzgojiteljev pogosteje te strokovne hospitacije občutijo kot dodatno psihično, fizično in časovno obremenitev. Jih pa vzgojitelji pogosteje dojemajo kot način prenosa dobre prakse, pa tudi kot nekaj neprijetnega in stresnega.

1   Introduction

Professional observations, both conducted by the principal or by colleagues, represent a good way to monitor and evaluate the pedagogical work of preschool teachers and assistant preschool teachers. By conducting the observations, the principal or another professional staff member not only gains insight into the interpersonal relationships among employees, the interactions within the classroom, the prevailing atmosphere in a class, and the opportunity to document all observed aspects, but it also involves recognizing and understanding specific pedagogical phenomena that occur during the pedagogical process (Koren, 2007). The timing and manner in which the principal or another professional staff member conducts professional observations depend on their discretion and the person being observed. Principals or other professional staff members often choose to conduct observations when indirect methods (daily, monthly, yearly preparations, notes, journals, etc.) do not provide all the necessary information for understanding the pedagogical process, or when they wish to directly observe the pedagogical work of an educational employee (Tomić, 1990). Before visiting the classroom, it is essential to determine the purpose and content of the monitoring, along with clear and understandable goals, as observations significantly impact the professional development of preschool teachers and assistant preschool teachers. Following an observation, preschool teachers and assistant preschool teachers receive feedback, ideas, opinions, and experience from the observer (principal or another professional staff member (Majhen, 2004). All of this significantly influences preschool teachers and assistant preschool teachers, providing them with a new impetus that serves as encouragement for their professional development and growth and thus significantly affects both their professional as well as personal development.

2   Theoretical Background

2.1   Professional Development of Preschool Teachers and Assistant Preschool Teachers

The only constant in life is change, especially in the field of education. Due to the demands for high standards and greater quality of work, preschool teachers must continually engage in professional development (Peček, 2009). OECD (2012) emphasizes the necessity of investing in the education of preschool teachers to

achieve high-quality results. The professionalism of preschool teachers, which includes values, ethical codes, skills, knowledge, and responsibilities, is a dynamic category dependent on social changes (Lepičnik Vodopivec and Hmelak, 2018). Caulfield (1997, in Lepičnik Vodopivec and Hmelak, 2018) describes it as a continuous effort to become professionals.

The career path of a preschool teacher consists of various stages, each with its own role, characteristics, and consequences. Individuals must independently shape their professional development, facing resistance to learning and change (Peček, 2009). The professional development of preschool teachers covers the entire life, from initial education to retirement (White Paper, 2011). Nekrep, Prah, and Slana (2006) highlight the need for continuous adaptation and upgrading of knowledge and skills. Hriberšek (2014) emphasizes the importance of in-depth professional assessment and quality education for professional development. Peček (2009) gives reasons for professional development, including improvement of work, including improvement of work, development of expertise and satisfaction at work.

In modern society, the roles and functions of schools are changing, imposing new demands on professionals. OECD (2009) emphasizes the need for professional development as preschool teachers face various challenges. The system of an ongoing education and training for professionals, as a form of lifelong learning, is crucial for their continuous development (Nekrep, Prah, and Slana, 2006). Professional development should be continuously evaluated and adjusted according to efficiency and needs (Nekrep, Prah, and Slana, 2006). Angus-Cole (2021) highlights various aspects of professional development, including work improvement, knowledge acquisition, collaboration with others, and reflection. Vonta (2009) emphasizes that the professional growth of preschool teachers affects the quality of children's education.

In the process of lifelong learning, preschool teachers develop their knowledge, skills, and practices while being responsible for their personal and professional activities (Hriberšek, 2014). Competencies that include knowledge, skills and personality traits are crucial for the work of preschool teachers (Zore, 2014). Internal and external factors influence the professional development of preschool teachers, where cognitive, social, and emotional-motivational aspects of personality are important internal factors, while external factors include environmental influences

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

115

(Ažman, 2012). Motivation, as a significant psychological factor, encourages preschool teachers to work effectively (Havkić, 2021).

Monitoring the educational process is essential for the comprehensive evaluation and improvement of the quality of professional work (Erčulj, 2015). The Inspectorate of the Republic of Slovenia for Education and Sport and the principals play a key role in monitoring and supervision (Gajšek, 2019). Bevc, Fošnarič, and Sentočnik (2002) emphasize the goals of monitoring pedagogical work, including raising the quality of education, supporting professional development, improving leadership, and self-evaluation.

In conclusion, the professional development of preschool teachers is crucial for ensuring a high-quality educational process. Systematic monitoring and continuous improvement are key elements that enable professionals to respond appropriately to the challenges of modern society.

2.2   Professional Observations in the Kindergarten

Professional observations in kindergarten represent a direct way of observing the pedagogical process and collecting data on the work of preschool teachers and assistant preschool teachers in educating children (Murgelj, 1996). During the internship, students observe their mentor, and later, the mentor or principal observes their work (Valenčič Zuljan et al., 2007, p. 14). Erčulj (2007) emphasizes that classroom observation requires special skills and must be concluded with feedback and further activities for improvement.

The reasons for conducting observations are diverse, including development-oriented detection of the real situation in the classroom and counseling preschool teachers how to improve their work (Erčulj and Širec, 2004). Observations can also serve to supervise professional work and assess the quality of teaching, which helps to guide and direct the preschool teaching staff (Murgelj, 1996). The process of monitoring and guiding preschool teachers' work requires that principals consider several key principles, including the responsibility of the observer and the teacher, the focus on the improvement of the institution, the balance between monitoring the process and the results, and the competence of all participants (Erčulj and Širec, 2006).

Observations are conducted in three models: evaluational (principal's observations), developmental (they are carried out by consultants from the Institute of Education), and collegial or mutual observations (conducted by colleagues within the kindergarten) (Gosling, 2002). The educational process in kindergarten is a central activity, so it is important for the management to gain insight into the quality of work. Observations help principals in the planning and implementation of additional professional training and encourage the professional development of professional staff (Murgelj, 1996). Direct observation of the pedagogical process is not the only way to obtain data, so the entire process should be considered (Erčulj, 2013).

Observations have an advisory, informative, and developmental-informational purpose. Sometimes, they also have a supervisory and evaluative purpose, depending on specific goals (Murgelj, 1996). Their purpose is to identify pedagogical problems and formulate measures to solve them (Tomić, 1990). Despite the importance of observations, they can be a disturbance and emotional burden for preschool teachers. In his work, Majhen (2004) states that the resistance to observations does not stem from the teachers' poor training or readiness for work. Many preschool teachers experience resistance due to the following factors:

- since they are aware that they are being observed, they are more nervous and consequently perform the activity less well
- they are often critical of their own work and believe that someone else would perform the activity better,
- there is often a fear that the teaching method used by the teacher may not be the best,
- because when being observed, preschool teachers often do not know the objectives of observing,
- because they do not know what the observer will observe.
- because the observation has not been announced in time and - there is a fear of the post-observation interview.

The supervision process should take place in stages, including a planning meeting, observation, and feedback (Tomič, 2002). Key principles include establishing trust between the educator and the observer, directing attention to improving pedagogical work, using objective data, and collaboration between the observer and the educator to improve both sides. It is important to plan the observations together with

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

117

preschool teachers in order to avoid misunderstandings and emphasize their importance (Erčulj, 2013).

Principal's Professional Observations

Conducting observations is an important activity of the principal because it enables him to gather the necessary information on the quality of the teacher's and assistant's work in the classroom and the work of the kindergarten as a whole through various methods and techniques. The principal may collect data on the course of the pedagogical process through indirect observation, mainly by using written sources such as daily, weekly, monthly, and yearly preparations, records, journals, etc. However, observations are the method that allows the principal to directly observe and collect data on the teacher's and assistant's work. They can be conducted randomly or systematically. The principal decides to visit a classroom when indirect methods and techniques do not provide enough information about the quality of pedagogical work within the classroom. When the principal decides to observe randomly, he primarily perceives those phenomena that attracted his attention at a given moment (Murgelj, 1996, p. 17). Whereas systematic monitoring involves predefined aspects of observation, with observations being recorded in real time (Tomič, 1990).

Feedback and discussions with the teacher after an observation can have various shades, either positive or negative, but it is crucial that it is constructive and focused on assistance and improvement. It is essential to avoid humiliation, as pointed out by Majhen (2004). The goal of the discussion is not only to point out the shortcomings and provide recipes for improving the work, but also to encourage the educator to self-reflection and jointly find ways for his/her professional development. This is emphasized by Erčulj and Širec (2004), who describe developmental feedback as a process of analysis, reflection, and development planning.

Communication principles play a key role in a successful discussion. It is necessary to create a trusting environment where the teacher actively participates, evaluates his/her work and the observer asks questions and directs the dialogue. It is important that the feedback focuses on the facts, avoids judgments, and relates to the teacher's work rather than his/her personality. Kosevski Puljić (2007)

emphasizes the characteristics of effective feedback, which should be descriptive, concrete, appropriate, useful, agreed upon, timely, and initially positive.

An important aspect is also the adaptation of the leadership style in providing feedback according to the individual characteristics of the educator. The three leadership styles presented (directive, collaborative, and non-directive) can serve as guidelines, with not one being the best, but selected according to the needs and complexity of the thinking of each expert (Bevc, Fošnarič, and Sentočnik, 2002). Feedback should be the starting point for encouraging the teacher's development, providing room for constructive discussion about improvements and progress.

The principal's observations can therefore be defined as an obligation, as a factor in the process of changing the educational practice and the process of monitoring the pedagogical work of each educator. Observations also provide insight into the quality of the pedagogical work of the entire educational institution and are a starting point for further changes in kindergarten and educational work (Širec et al., 2013). In their work, they state that properly planned and conducted observations can be used as an element for the professional development of each teacher and the development of the entire team and kindergarten as an educational institution.

3   Methodology

The purpose of this study was to investigate how professional observations affect the professional development of preschool teachers and assistant preschool teachers. We hypothesized that they have a greater impact on preschool teachers who are responsible for an appropriate preparation, implementation, and evaluation of the educational process in a group of children under their guidance.

We implemented a descriptive and causal non-experimental method of educational research. The research was based on a non-random sample from a specific situation. The sample consisted of preschool teachers and assistant preschool teachers. A total of 201 respondents answered the survey. Most respondents (27.9%) have been working for more than 21 years. 25.4% of respondents have 11 to 15 years of work experience, 17.9% of respondents have 16 to 20 years of work experience, and 14.4% have been working for 0 to 10 years. The largest share of respondents (68.2%)

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

119

are employed as preschool teachers, while a smaller share (31.8%) of respondents are assistant preschool teachers.

The data were collected through a survey questionnaire. The first part of the questionnaire consisted of questions about objective facts (work experience, job position). The following questions were related to professional observations. The survey was conducted individually and anonymously via the 1KA online platform.

The data were processed with the SPSS program, presented in tables and determined the absolute (f) and percentage (f %) frequencies. The Mann-Whitney U test was used for analyzing the differences between the statements according to the gender and job position of the respondents and the Kruskal-Wallis test to analyze the differences according to the age group and the years of work experience.

The findings of this study aim to contribute valuable insights into the impact of professional observations on the professional development of preschool teachers and assistant preschool teachers, shedding light on potential variations across demographic factors.

4   Results and discussion

First, we were interested in how often the **principal** conducts professional observations in kindergarten according to the respondents' opinions. The majority (36.8%) of respondents answered that the principal rarely conducts professional observations in kindergarten, while the least (4.5%) of respondents answered that the principal always conducts professional observations. 34.8% of respondents marked the answer "sometimes," 16.4% "often," and 7.5% „never." The outcome of the $\chi2$-test indicated there are no statistically significant differences in relation to the respondents' years of work experience (P = 0.436), but there were significant differences in relation to job position (P = 0.007). From the data obtained, it can be concluded that the majority (42.3%) of respondents employed as preschool teachers chose the answer that the principal rarely conducts professional observations, while the majority (53.1%) of respondents employed as assistant preschool teachers chose the answer "sometimes." The fewest preschool teachers (5.1%) as well as assistant preschool teachers (3.1%) answered that the principal always conducts professional observations.

Discussion: The obtained data were somewhat surprising, as we expected more frequent professional observations by principals. We were even more surprised that as many as 7.5% of respondents answered that the principal never conducts professional observations in their kindergarten. The principal's professional observations are considered an obligation through which the principal monitors the educational practice. They also enable him to obtain additional or first-hand information about the work of the preschool teachers and assistant preschool teachers in the classroom, positively influencing their professional development.

Further Inquiry: We then researched the opinion of the respondents on the impact of the principal's professional observations on their professional development.

Table 1: Number (f) and structural percentages (f %) according to the impact of the principal's professional observations on professional development

Impact of Principal's Professional Observations on Professional Development	f	f %
I believe that professional observations do not affect my professional development.	68	33,8 %
I believe that professional observations influence my professional development to some extent.	113	56,2 %
I believe that professional observations strongly affect my professional development.	20	10,0 %
Total	201	100,0 %

More than half (56.2%) of the respondents believe that the professional observations conducted by the principal have some influence on their professional development, while 10.0% believe they have a significant impact. The χ2 test outcome showed that there were no statistically significant differences according to the years of experience (P = 0.122) and job position (P = 0.457).

In the following, we were also interested in the extent to which respondents agree with the offered statements about professional observations. For each statement, they expressed their agreement on a three-step scale. The results showed that 43.3% of respondents disagreed with the sixth and seventh statements. Regarding the eighth statement, more than half (55.2%) of respondents answered that they neither agree nor disagree with the given statement. Regarding all other statements, we noticed that the respondents agreed to a greater extent.

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

121

Table 2: The outcome of the Kruskal-Wallis test of differences in statements from T1 to T9 according to the respondents' work experience

Statements	Work experience	$\bar{R}$	χ^2	g	P
Professional observations represent an additional mental and physical burden.	0–5 years	102,38	5,461	4	0,243
	6–10 years	114,09			
	11–15 years	99,95			
	16–20 years	107,88			
	21 years and more	90,04			
Professional observations are something unpleasant and stressful.	0–5 years	98,71	3,778	4	0,437
	6–10 years	108,24			
	11–15 years	101,81			
	16–20 years	111,04			
	21 years and more	91,24			
Professional observations represent an additional time burden.	0–5 years	103,07	2,215	4	0,696
	6–10 years	105,57			
	11–15 years	98,91			
	16–20 years	108,17			
	21 years and more	93,82			
Professional observations cause the atmosphere in the classroom to be different from the atmosphere when there are no observations.	0–5 years	125,28	11,507	4	**0,021**
	6–10 years	101,90			
	11–15 years	102,91			
	16–20 years	101,31			
	21 years and more	86,03			
I prefer pre-announced professional observations.	0–5 years	123,29	9,371	4	0,052
	6–10 years	108,48			
	11–15 years	93,32			
	16–20 years	94,36			
	21 years and more	96,84			
Preschool teachers and assistant preschool teachers with less than 10 years of work experience require more professional observations than those with more than 10 years of work experience.	0–5 years	78,66	30,702	4	**<,001**
	6–10 years	69,72			
	11–15 years	93,90			
	16–20 years	113,1			
	21 years and more	127,45			
Professional observations conducted by the principal are more relaxed and less stressful.	0–5 years	109,19	4,654	4	0,325
	6–10 years	89,74			
	11–15 years	109,27			
	16–20 years	90,24			
	21 years and more	101,97			
	0–5 years	98,00	3,359	4	0,500

Statements	Work experience	$\bar{R}$	χ^2	g	P
Professional observations conducted by other professionals are more stressful, but still relaxed.	6–10 years	100,17			
	11–15 years	111,82			
	16–20 years	92,50			
	21 years and more	98,59			
Professional observations represent a good way to transfer best practices.	0–5 years	96,43			
	6–10 years	93,59			
	11–15 years	101,56	3,347	4	0,502
	16–20 years	112,24			
	21 years and more	99,47			

The table above shows the extent to which respondents agree or disagree with the offered statements, depending on their years of work experience. The outcome of the Kruskal-Wallis test showed there are statistically significant differences in some statements, specifically in the 4th and 6th statements. As a minimum possible answer, answer 1 is defined – I do not agree, and the maximum answer is 3 – I agree. From the fourth statement, we can see that there is a statistically significant difference (p = 0.021). Respondents who have been working between 0 to 5 years agree with this statement the most (R = 125.28), while those who have been working for more than 21 years agree the least (R = 86.03). There are also statistically significant differences in the statement: "Preschool teachers and assistant preschool teachers who have been working for less than 10 years need more professional observations than preschool teachers and assistant preschool teachers who have been working for more than 10 years." (p = < 0.001). Respondents who have been working for more than 21 years agreed the most with this statement (R = 127.45), while those who have been working for 6 to 10 years agreed the least (R = 69.72). There are no statistically significant differences for the remaining statements.

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

123

Table 3: The outcome of the Kruskal-Wallis test of differences in statements from T1 to T9 according to the respondents' job position

Statements	Job position	$\bar{R}$	U	P
Professional observations represent an additional mental and physical burden.	Preschool teacher	100,19	4273,500	0,737
	Assistant preschool teacher	102,73		
Professional observations are something unpleasant and stressful	Preschool teacher	101,72	4286,00	0,780
	Assistant preschool teacher	99,47		
Professional observations represent an additional time burden.	Preschool teacher	100,58	4327,000	0,872
	Assistant preschool teacher	101,89		
Professional observations cause the atmosphere in the classroom to be different from the atmosphere when there are no observations.	Preschool teacher	101,69	4289,500	0,779
	Assistant preschool teacher	99,52		
I prefer pre-announced professional observations.	Preschool teacher	98,03	3976,500	0,199
	Assistant preschool teacher	107,37		
Preschool teachers and assistant preschool teachers with less than 10 years of work experience require more professional observations than those with more than 10 years of work experience.	Preschool teacher	102,13	4229,000	0,664
	Assistant preschool teacher	98,58		
Professional observations conducted by the principal are more relaxed and less stressful.	Preschool teacher	99,61	4194,000	0,591
	Assistant preschool teacher	103,97		
Professional observations conducted by other professionals are more stressful, but still relaxed.	Preschool teacher	95,90	3685,000	**0,043**
	Assistant preschool teacher	111,92		
Professional observations represent a good way to transfer best practices.	Preschool teacher	102,53	4174,000	0,483
	Assistant preschool teacher	97,72		

The table above shows the outcome of the Mann-Whitney U-test. As a minimum answer, answer 1 was defined – I do not agree, and the maximum answer is 3 – I agree. Based on the data obtained, it can be said that there are no significant differences between preschool teachers and assistant preschool teachers in agreeing with the offered statements. However, a statistically significant difference occurred in the statement: "Professional observations conducted by other professionals are more stressful, but still relaxed." (p = 0.043). Assistant preschool teachers of preschool children agree with this statement the most (R = 111.92).

In Table 2, we were surprised by the difference in agreement with the sixth statement: "Preschool teachers and assistant preschool teachers who have less than 10 years of experience need more professional observations than preschool teachers and assistant preschool teachers who have more than 10 years of experience." Respondents who have been working for more than 21 years largely agreed with the statement, while those with 6 to 10 years of work experience disagreed the most. We believe that there should be no difference in the frequency of professional observations based on years of work experience between preschool teachers and assistant preschool teachers; professional observations should be conducted for everyone regardless of their years of work experience.

In Table 3, we notice a statistically significant difference in the statement: "Professional observations conducted by other professionals are more stressful, but still relaxed." Assistant preschool teachers agreed more with this statement. We were somewhat surprised by this finding, as we expected that preschool teachers responsible for group work would agree more with the given statement.

5   Conclusion

The professional development of preschool teachers is a fundamental element of the quality of kindergarten operation. Therefore, it is important that the management understands it as a systematic, planned and controlled process, both at the individual level as well as at the level of the entire organization. In addition to traditional education (seminars, workshops, etc.), there are various more intensive practices and tools that enable systematic and in-depth professional learning. These tools include observations conducted by principals (Rupnik Vec, 2020). Well-planned and carried out observations can be used as one of the elements of the professional development

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

125

of preschool teachers and the development of the entire team and institution (Širec et al., 2013). The implementation of observations and feedback on its implementation are challenging tasks for which it is important that its participants are properly trained (Erčulj, 2020).

In this research, we assumed that the professional observations conducted by the principal would have a greater impact on preschool teachers responsible for the preparation, implementation, and evaluation of the educational process in a group of children they lead. Assistant preschool teachers only help them with this. Based on the results of the research, we cannot fully confirm this assumption. It was often observed that assistant preschool teachers more often perceive these professional observations as an additional mental, physical, and time burden, and they (more often than preschool teachers) feel that principals conduct them more frequently. However, preschool teachers more often perceive them as a way of transferring best practices.

However, one of the weakest points in the monitoring and evaluation of pedagogical work is still the use of findings or data obtained by the observer during the process of observation. The basic purpose of the data thus obtained is to plan the professional development of an individual in connection with improving the work of the entire educational institution (ibid.). Lešnik (2021) states that the starting point for the principal should be the awareness that conducting observations provides an important opportunity for the professional growth of preschool teachers and assistant preschool teachers. Therefore, it is essential for the principal to believe that by monitoring the work of an individual preschool teacher, he encourages the improvement of practice and thus influences the provision of quality of the most important process in the educational institution, which is upbringing and learning. However, if a principal conducts observation merely because it is his/her duty, he/she cannot expect preschool teachers and assistant preschool teachers to see it as an incentive for better and more efficient work. Because it is precisely the monitoring that enables the principal to get in touch with teaching, discovering the preschool teacher's strong parts as well as weak ones, which the preschool teacher should develop a little further.

References

Angus-Cole, K. (2021). *Education Brief: Teacher professional development.*
https://www.cambridgeinternational.org/Images/621009-teacher-professional-development-facsheet.pdf

Ažman, T. (2012). *Sodobni razrednik: priročnik za usposabljanje učiteljev za vodenje oddelčnih skupnosti.* Zavod Republike Slovenije za šolstvo.

Bevc, V., Fošnarič, A. in Sentočnik, S. (2002). *Spremljanje in vrednotenje pedagoškega dela strokovnih delavcev.* Zavod Republike Slovenije za šolstvo.

Erčulj, J (2013). Ravnateljevo spremljanje in usmerjanje učiteljevega dela v kontekstu vodenja za učenje. *Vodenje v vzgoji in izobraževanju, 11* (3), 47−69.

Erčulj, J (2015). Spremljanje in opazovanje pouka: ravnateljeve in medsebojne hospitacije. In M. Zavašnik Arčnik in J. Erčulj (Ed.*), Izbirna poglavja iz vodenja v vzgoji in izobraževanju* (p. 27−49). Ljubljana, Šola za ravnatelje.

Erčulj, J in Širec, A (2006). *Spremljanje in usmerjanje učiteljevega dela: priročnik za ravnatelje.* Šola za ravnatelje.

Erčulj, J in Širec, A. (2004). Spremljanje in usmerjanje učiteljevega dela − (zamujena) priložnost ravnateljev za izboljšanje kakovosti vzgojno-izobraževalnega dela. *Vodenje v Vzgoji in izobraževanju, 2* (3), 5−24.

Erčulj, J. (2007). Spremljanje in opazovanje pouka. In M. Brejc, J. Erčulj in V. Logaj (Ed.), *Ravnatelj kot pedagoški vodja* (p. 28−38). Ljubljana, Šola za ravnatelje.

Erčulj, J. (2020). Hospitacije v vlogi spremljanja dela strokovnih delavcev. In J. Erčulj in M. Zavašnik (Ed.), *Spremljanje dela strokovnih delavcev v vzgoji in izobraževanju: izzivi in priložnosti* (p. 5−20). Ljubljana: Šola za ravnatelje.

Gajšek, R. (2019). Koraki pri spremljanju pouka v osnovni šoli. In S. Čagran, J. Erčulj in B. Likon (Ed.), *Iz prakse za učinkovito ravnateljevanje* (p. 170−179). Ljubljana, Šola za ravnatelje.

Gosling, D. (2002). *Models of peer observation of teaching.*
https://www.researchgate.net/publication/267687499_Models_of_Peer_Observation_of_Teaching

Havkić, A. (2021). Motivacija strokovnih delavcev v vrtcu. In M. Željeznov Seničar (Ed.), *Sodobni izzivi vrtca* (p. 114−116). Ljubljana: MiB.

Hriberšek, V. (2014). Profesionalni razvoj preschool teachera. In M. Željeznov Seničar (Ed.), *Kompetence preschool teachera – izzivi, izkušnje, spoznanja* (p. 78−84). Ljubljana, MiB.

Koren, A. (2007). *Ravnateljevanje: vprašanja o vodenju šol brez enostavnih odgovorov.* Fakulteta za management; Šola za ravnatelje.

Kosevski Puljić, B. (2007). Opazovanje pouka in povratna informacija. In C. Peklaj (ed.), *Mentorstvo in profesionalna rast učiteljev* (p. 75−92). Ljubljana, Center za pedagoško izobraževanje Filozofske fakultete.

Lepičnik Vodopivec, J. in Hmelak, M. (2018). *Preschool teacher predšolskih otrok in skrb za lastni profesionalni razvoj.* Založba Univerze na Primorskem.

Lešnik, V. (2021). Vloga hospitacij v pedagoškem vodenju ravnateljev. *Vodenje v vzgoji in izobraževanju, 49* (2), 71−89.

Majhen, D. (2004). Hospitacije – ne, hvala! *Didaktika, 14* (80−81), 31−33.

Murgel, T. (1996). Hospitacije v očeh učiteljev. *Vzgoja in izobraževanje, 27* (5), 17−21.

Nekrep, A., Prah, K. in Slana, J. (2006). Sodobni model izobraževanja kot spodbuda za profesionalni razvoj učiteljev. In C. Peklaj (Ed.), *Teorija in praksa v izobraževanju učiteljev* (p. 69−78). Ljubljana, Center za pedagoško izobraževanje Filozofske fakultete.

OECD (2009). *Creating effective teaching in learning environments: First results from Talis.* OECD Publishing.

OECD (2012). *Starting Strong III: A quality toolbox for early childhood education and care.* OECD Publishing.

Peček, P. (2009). Profesionalni razvoj zaposlenih v šolstvu. In S. Jančan (Ed), *Profesionalno usposabljanje strokovnih delavcev v vzgoji in izobraževanju: yearsni pogovor* (p. 11−19). Kranj, Šola za ravnatelje.

M. Hmelak, L. Mlakar: Kindergarten Principals' Professional Observations and Professional Development of Preschool Teachers

127

Rupnik Vec, T. (2020). Razvojni e-listovnik učitelja − pomoč ravnatelju pri spremljanju dela in profesionalnega razvoja strokovnega delavca. In J. Erčulj in M. Zavašnik (Ed*.), Spremljanje dela strokovnih delavcev v vzgoji in izobraževanju: izzivi in priložnosti* (p. 74−85). Ljubljana, Šola za ravnatelje.

Širec, A., Ašič, A., Ambrož Bezenšek, M., Bogataj, J., Cerar, L., Fridrih, K., Gajšek, R., Novšak, A., Pavc, J., Ravnik, D. in Vidmar, J. (2013). Uvajanje ravnateljevih in kolegialnih hospitacij pri spremljanju aktivnega učenja otrok in učencev. *Vodenje v Vzgoji in izobraževanju, 11* (3), 71−96.

Tomić, A. (1990). *Teorija in praksa spremljanja pouka.* Zavod Republike Slovenije za šolstvo.

Valenčič Zuljan, M., Vogrinec, J., Brank, M., Pohar, H., Krištof, Z. in Bizjak, C. (2007). *Spodbujanje profesionalnega razvoja učiteljev pripravnikov.* Pedagoška fakulteta; Ministrstvo za šolstvo in šport.

Vonta, T. (2009*). Razvoj pedagoških idej v organizirani predšolski vzgoji.* Pedagoški inštitut.

Zore, N. (2014). Pomen kompetenc vzgojiteljev in pomočnikov vzgojiteljev pri zagotavljanju kakovosti vrtca. In M. Željeznov Seničar (Ed.), *Kompetence preschool teachera − izzivi, izkušnje, spoznanja* (p. 6−12). Ljubljana, MiB.

"THE EXPERIENCES ARE BEYOND OUR EXPECTATIONS": CHANGING THE CULTURE OF ARTIFICIAL INTELLIGENCE AND SOCIAL AND EMOTIONAL LEARNING IN EDUCATIONAL INSTITUTIONS – A QUALITATIVE EVALUATION AMONG REPRESENTATIVES OF THE SETCOM PROJECT PARTNERS

ANDREJA KOZMUS, MARJAN KRAŠNA, JOCA ZURC
University of Maribor, Faculty of Arts, Maribor, Slovenia
andreja.kozmus@um.si, marjan.krasna@um.si, joca.zurc@um.si

In the evolving field of education, the intersection of artificial intelligence (AI) and social and emotional learning (SEL) is increasingly relevant. This article presents a qualitative evaluation among twelve representatives from eight SETCOM project partners to learn about their views, experiences and expectations regarding the project's content and organization. The findings indicate that despite initial apprehensions about AI, there was enthusiasm for its potential intersection with SEL. Participants appreciated collaborative opportunities and sought practical applications for project insights, aiming to enhance existing programs and stimulate new ideas. Challenges included managing tasks amidst AI's rapid evolution and the initial separation of the AI and SEL domains. The lack of AI regulations was a concern. Participants advocated for a proactive approach by educators in assessing AI applications, emphasizing ethical considerations in their use.

"Izkušnje presegajo naša pričakovanja": Spreminjanje kulture umetne inteligence ter socialnega in čustvenega učenja v izobraževalnih ustanovah – kvalitativna evalvacija med predstavniki partnerjev projekta SETCOM

Andreja Kozmus, Marjan Krašna, Joca Zurc
Univerza v Mariboru, Filozofska fakulteta, Maribor, Slovenija
andreja.kozmus@um.si, marjan.krasna@um.si, joca.zurc@um.si

Na razvijajočem se področju izobraževanja postaja presečišče umetne inteligence (UI) ter socialnega in čustvenega učenja (SČU) vse bolj pomembno. Članek predstavlja kvalitativno evalvacijo, izvedeno med dvanajstimi predstavniki osmih projektnih partnerjev projekta SETCOM, s katero smo želeli spoznati njihove poglede, izkušnje in pričakovanja glede vsebine in organizacije projekta. Ugotovitve kažejo, da so bili udeleženci, kljub začetnim pomislekom glede UI, navdušeni nad njeno potencialno sinergijo s SČU. Hvaležni so bili priložnosti za sodelovanje in si prizadevali za praktično uporabo projektnih spoznanj; za izboljšanje obstoječih programov in spodbujanje novih zamisli. Izzive jim je predstavljalo upravljanje nalog med hitrim razvojem UI in iskanje povezav med sprva ločenima domenama UI in SČU. Pomanjkanje predpisov o UI se jim je zdelo zaskrbljujoče. Udeleženci so se zavzeli za proaktivni pristop učiteljev pri ocenjevanju aplikacij UI, pri čemer so poudarili etične vidike njihove uporabe.

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions – a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

131

1 Introduction

The pervasive influence of the digital realm has fundamentally reshaped our daily lives, revolutionizing how we communicate and interact with the world. While technological progress has bestowed numerous advantages upon us, it has concurrently introduced novel challenges to our social and emotional well-being. AI has the potential to make people's lives better in various ways; however, if AI is misused because of biased algorithms and a lack of rules, it could harm human rights and lead to unequal treatment by gender, race, etc. (Yang et al., 2021).

As digital technologies, including social media platforms, online learning environments, and communication tools continue to proliferate, there is a pressing need to thoroughly evaluate their effects on the social and emotional well-being of its users. Emotional well-being is characterized by the ability to experience and express a spectrum of emotions in a healthy and adaptive manner, fostering positive relationships, effectively managing stress, and cultivating an overall sense of contentment and fulfilment in life (Bakračevič Vukman & Licardo, 2010; WHO, 2014). Social well-being encompasses the quality and breadth of one's social relationships, support systems and community engagement, including elements such as a sense of belonging, connection, and positive social interactions (Košir, 2013). The most common definition of SEL components includes self-awareness, self-management, social awareness, relational skills, and responsible decision-making (Weissberg et al., 2015).

1.1 The importance of SEL in the digital world of education

The deep integration of AI in education is noticeable in learning analytics, adaptive learning, intelligent tutoring systems, and the emerging concept of human-centred artificial intelligence (HCAI) (Shneiderman, 2020). Tools that can help teachers in their work include the following: the AI-enabled conversational robot (Chabot), AI-enabled personalization, smart content, learning pathways and recommendations, automatic evaluation of student learning outcomes with grading policy, intelligent assessment and evaluation, automatic question generation, automatic grading, AI-enabled plagiarism detection etc. (Yang et al., 2021).

The digital landscape provides a continual sense of connection, convenience, and information access. However, overusing informational and communicational technology impedes overall learning by causing challenges in maintaining focus and attention, influencing memory processes, and conflating online social environments with reality, resulting in additional issues related to self-image and self-esteem (Firth et al., 2020). An overreliance on digital devices and online interactions can precipitate feelings of loneliness, anxiety, and depression (Hunt et al., 2018), cyberbullying (Kozmus & Pšunder, 2022), attention difficulties (Kozmus & Kozmus, 2023), and diminished well-being (Valkenburg, 2022). The ubiquity and profusion of online information are dynamically reshaping cognitive processes, influencing the acquisition, storage, and evaluation of knowledge, which enables individuals to engage in autonomous and critically evaluative information processing across diverse contexts (Ackerman and Thompson, 2014). The significance of this autonomous and critical information assessment becomes particularly pronounced in the realm of online information dissemination, where factual content often intermingles with misinformation, propaganda, and manipulative elements, thereby exerting a notable influence on decision-making processes (Wang, 2022).

In response to these challenges, educators and educational and other institutions should promote responsible social media usage, cultivate digital literacy skills, and create secure online environments that foster positive interactions and improve emotional and social well-being. Future AI should become more focused on considering human contexts and societal dynamics, to amplify human intelligence and promote people's well-being (Yang et al., 2021). HCAI is therefore a promising approach for designing AI systems that support creativity, responsibility, and social engagement. It also emphasizes considerations of privacy, security, environmental protection, social justice, and human rights (Shneiderman, 2020).

Maintaining a harmonious equilibrium between the digital and real worlds is essential for preserving psychological and social health and flourishing in our progressively interconnected society. By nurturing critical thinking, empathy, and digital literacy skills, students can foster a positive online presence, participate in respectful online interactions, and contribute to an inclusive digital culture. Educational contexts should prioritize SEL, emphasizing skills like empathy, self-awareness, and

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

133

relationship building. The systematic cultivation of these social and emotional skills allows educators to aid students in developing resilience, empathy, and positive social behaviours, in both the online and offline realms. Moreover, teachers are the main promotors of the implementation, evaluation, and outcomes of SEL programmes (Vršnik Perše et al., 2020).

Empirical study

In the framework of the SETCOM project, a qualitative evaluation was planned at the time of the project application, together with a quantitative one, to gain broader insight into the reflections, experiences, and expectations of the project participants regarding the organisation and content of the project (Zurc & Ferligoj, 2023).

In this article we present the findings from the representatives of all eight SETCOM partner institutions on the project's progress, their perceptions on the importance of participation in the project, the organisational and content composition of the project team, the applicability of the project outcomes, suggestions for further activities and transfer of the knowledge and skills acquired in the project.

1.2   Method

Based on our previous studies on qualitative higher education evaluation at the University of Maribor (Zurc, 2021, 2022, 2023), a qualitative study with a group interview was designed to obtain personal and group reflections, experiences, expectations, agreements, and the individual views of participants on the project's progress and future development. A group interview was carried out at the 7th pedagogical meeting of the project on the 23 November 2023 by the MS Teams online meeting tool. All participants were familiar with the topics of discussion and had sufficient experience to discuss the given questions, since they are all actively involved in the implementation of the project. The interview was recorded, and findings are presented jointly.

1.3   Measurement tool

A semi-structured interview was designed and used as a measurement tool to guide conversation with the project partners' representatives. The questions were designed to cover their reflections from the initial decision to join the project, through the experience of project implementation, to the planning of activities and the implementation of the results obtained from the project. The questions were simple and open-ended and follow the methodological recommendations for designing and implementing group interviews (Klemenčič & Hlebec, 2007).

Interview questions:

1.   What does participation in SETCOM mean to you personally and to your institution?
    a.   What are your feelings about, and experiences with the project?
    b.   Who motivated or invited you to participate in the project?
    c.   Why did you decide to participate in the project?
    d.   What are your expectations?
2.   How did you approach the implementation of the project (organisation, content)?
    a.   How did you divide the project tasks in your organisation?
    b.   How do you communicate within your project team?
3.   In what ways do you use/transmit the results of the project in your environment?
    a.   Has SEL/AI helped you to change the climate and communication methods in your organisation with stakeholders (e.g., learners)?
4.   Where do you see opportunities to apply and further develop the skills and equipment acquired during the project in your work and life in the future?
    a.   Do you think that the use of SEL/AI will change in your organisation because of the project activities?

1.4   Data collection procedure

The data collection protocol precisely followed the protocol of previous studies on qualitative higher education evaluation with group interviews involving students and personnel from the University of Maribor (Zurc, 2021, 2022, 2023). A qualitative

A. Kozmus, M. Krašna, J. Zurc: *"The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners*

135

evaluation with representatives of all eight SETCOM project partners was carried out on 23 November 2023, from 13h 6m 0s to 14h 41m 40s. The group interview thus lasted a total of 1 hour, 35 minutes and 40 seconds. The whole conversation was carried out remotely by MS Teams, which had previously been used for project communication, especially with the Norwegian partner. The date of the meeting was pre-determined, in the framework of the organisation of the planned 7th pedagogical meeting and coordinated with the participants.

Although no preparation for participation was necessary, all participants were informed in advance of the selected topics of discussion during the first and second invitation letters (10.10.2023 and 19.11.2023), together with the link to the online group interview. The meeting was held in English; however, translation support for answering in English was available from the interview providers but was hardly needed.

The entire data collection process was conducted in accordance with the fundamental ethical principles of qualitative research. Participants voluntarily agreed to participate in the group interview and were informed that they could withdraw their participation at any stage of the research without consequences. The analysis of the data collected was conducted in a way that ensured the anonymity of the participants. The material collected was analysed without distinguishing between the statements of individual participants. Personal data and any information that could in any way reveal the identity of the participants was removed from the analysis and presentation of the results (Zurc, 2023).

1.5   Sample

One or two representatives, a leader and/or a multiplier from each of the SETCOM project partners--the University of Maribor, Nord University, the Maribor Friends of Youth Association, the Maribor Andragogical Institute, the Municipality of Maribor, the Hoče Kindergarten, the Draga Kobala Maribor Primary School, and the Secondary School of Economics and Gymnasium Maribor--were invited to participate in the group discussion held at the 7th Pedagogical Meeting. The representation of all partners in the group discussion provided the implementers

with a holistic picture of the contribution from each partner participating in the SETCOM project. The representative of one project partner was able to be present for only a part of the meeting; therefore, she provided written responses to the initial discussion topics received on the second invitation to the group interview.

1.6   Data analysis procedure

Data analysis was carried out by qualitative content analysis manually in MS Word. The qualitative analysis process was based on three levels of analysis (codes → categories → themes) (Adam et al., 2012). The individual themes/categories are presented or illustrated by verbatim statements from the participants. The results are presented in the tables below.

2   Results

Tables 1 to 4 present the results in more detail; the conceptual design of each theme, the categories, and codes, each illustrated by authentic statements from the interviewees.

Table 1 presents the factors that, according to the interviewees, were decisive in their approach to the project, the feelings they experienced and the expectations they had of the project, especially at the beginning.

In the first place, participants pointed out that they were invited to the project, that they were interested in learning something new (about SEL and AI) and that they found the combination of AI and SEL interesting. Other important motivations included the desire to be involved in a large project, having been without a project at the time prior to applying, being employed in such a position, and being interested in networking with people working in diverse fields:

> *"And I decided to participate in this project because it was interesting for me how we will find solutions for synergies between social emotional skills and AI. It was interesting that at the beginning nobody really knew a lot about AI, how to implement it in the education, research work or whatever we do. And because I like to learn" (P-1/1).*

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

137

Table 1: The importance of participating in the project

Theme	Categories	Codes
The importance of participating in the project	motive/decision to participate	invitation (5) learning new things (knowledge about SEL, how to integrate AI into work) (4) interesting design, relevance of the project (combination of AI and SEL and finding links) (4) desire to participate in a large project desire to acquire the project employment in a project position in the organisation bringing diverse people together
	feelings/experience of the project	fear of how to act/contribute to the project (3) gratitude for joint (informal) activities (2) gratitude for cooperation and communication (2) fear of, prejudice against AI gratitude for education on SEL insecurity about the wide gap between SEL and AI unfamiliarity with how to work with representatives from different organisations the project enriches them joy at seeing the results so far
	expectations for the project	translating knowledge into practice, enriching programmes, new opportunities for action, educational planning (6) applying new knowledge, ideas, help for the future (5), high expectations for the SETCOM Competence centre (2) cooperation, staying in touch, networking (2) good conference good monograph formal participation in the development of AI policy at the organisational level

Representatives from the partner institutions mostly felt a sense of awe and gratitude. Fear of how to act to contribute to the project, fear of or prejudice towards the AI and gratitude for the common (informal) activities, for the cooperation and communication, but also for the training in SEL. They also mentioned uncertainty regarding the gap between SEL and AI, the unfamiliarity of working with representatives from different organisations, the enrichment from the project, and the joy of recognising their achievements so far.

"We are feeling very good about the project, and the experiences are beyond our expectations. We have learned a lot about AI. We are also transferring all this knowledge to our colleges and what is very worthwhile is the network we have built in this project" (P-4).

They also presented their expectations from the project. Many of them stated that they expected to put what they had learnt into practice, to enrich their existing programmes, to come up with ideas, to find new ways of working in their organisation, to plan training and to use the new knowledge and ideas they had acquired in the project to help them in the future. They also highlighted their high expectations for the SETCOM Competence Centre, their wish to continue to cooperate, stay in contact and network in the future in various activities, including possible future projects, and the good outcome of the planned conference, the publication of a good monograph, the end of the project and their formal participation in the making of policy on AI.

"My expectations are that (…) the Competence Centre will continue to help us with using AI wisely and sharing this idea among (…) teachers and other people from the community" (P-3).

Table 2 presents the ways in which the representatives of the project partners divided up the project tasks in terms of organisation and content, the way in which communication within the project team took place and the challenges they faced because of their involvement in the project.

In the distribution of project tasks, the representatives of the partner institutions often pointed out the initial separation of tasks according to the content related to AI/SEL and the separation of training according to AI/SEL. Some of them pointed out that they were already a coordinated team when working on projects, or that the organisation had several coordinators. Usually, the representatives had regular meetings with their superiors, reported to colleagues or held weekly technical meetings.

"So mostly (…) has done the AI and mostly (…) has done the SEL and I have mostly been doing both - sort of" (P-2/2).

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

139

Table 2: Organisational and substantive implementation of the project

Theme	Categories	Codes
Organisational and substantive implementation of the project	distribution of project tasks	division of tasks, according to the content of SEL, AI (2) separation of training, according to the content of SEL, AI (2) involvement in the established modus operandi (2) multiple coordinators regular meetings with management, presentations to other staff (2) weekly technical meetings
	communication between project collaborators	live: regular participation (2) live: communication with superiors and accounting (2) lots of meetings (2) live: weekly meetings hybrid: bi-monthly meeting of representatives mostly online: regular meetings
	challenges of the project	too many tasks, too much work, not enough technical support (4) only one involved in the project in the organisation (lots of activities) (2) communication gap between SEL representatives and AI representatives (2) little communication takes place, mainly to inform colleagues

Communication between those involved in the project within and between organisations was mostly face-to-face, or online, but also in hybrid formats. Representatives highlighted the frequency of meetings, especially when the two areas of focus, AI and SEL, were separate.

> *"Well, most of the time we communicate online, even if technically we are all located in the same office building, we communicate through e-mail and MS Teams and we did most of our meetings online" (P-2/1).*

The challenges most frequently cited were too many tasks and work, not enough technical support, and a lot of monitoring of new developments, since many changes in the field of AI were taking place during the project period. In some organisations, only one person was involved in the project and that individual thus had more work to do.

"Additionally, we didn't have and still don't have enough technical support. (…) It is a lot of work. Those are all meetings that some of us must attend. So, it's a lot of meetings for some of us" (P-1/1).

"I will be brief; because I am the only one in our organisation that worked on this project, I didn't have that much communication with other colleagues" (P-6).

Table 3 presents the ways in which representatives of the partner institutions are integrating the project results into their own environments.

Table 3: Transfer of project results into the environment

Theme	Categories	Codes
Transfer of project results to the environment	knowledge transfer	various knowledge transfers (3) lots of learning about AI, as it is constantly changing (3) changing teaching and learning processes a more person-centred approach to working with AI, how it can and cannot be used a focus on the beneficial use of AI everyone is aware of the importance of SEL and how to use it
	gradual introduction of changes	the climate has changed little (2) not much change, a lot of talk about the social and emotional competences first steps have been taken, there is always a learning curve we have started to talk, changes are happening it's a process, it hasn't spread everywhere yet, success depends on acceptance by colleagues AI is a new world, talking about it, using the tools is not of interest to everyone in the organisation
	no changes	the climate has not changed they have not changed the way they communicate in general, they do not have many problems in communication no changes in AI yet

The interviewees consider that knowledge transfer in the different areas is going well so far, that there are constant changes in the way AI is used and therefore much learning is needed in this area, but they are focusing on finding beneficial uses for AI. They have a more person-centred approach to AI.

"First, we define goals, focus on the development of social and emotional competences and on understanding the basics of AI; we prepared materials, the font, image, and videos of robots and borrowed a book about robots

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

141

and social animation. We encourage activities to promote collaboration, empathy, conflict, resilience, and communication among young people" (P-5/2).

Many people stressed the gradual introduction of changes in the organisation, which are not yet very visible in the climate of the organisation. They have taken the first steps, but there is always a learning curve. They speak a lot about SEL. The acceptance of change by colleagues is important, but since AI is a new world, not everyone is yet interested in this tool and individual colleagues accept changes differently.

> *"About the transfer, the results of the project for my environment, for instance, a week ago I prepared a workshop for our (…) service. The topic was how to use AI in our personal lives, and maybe just for fun as well. And I was a bit disappointed because there was no interest in the workshop" (P-6).*

A few interviewees said that they had not noticed any changes in the organisational climate or in the appropriate communication, and that they had not yet noticed any changes in the use of AI.

Table 4 presents the potential for further use and development of skills and equipment in future work. The responses are grouped into four categories: awareness, improvement of existing activities, introduction of new activities and future challenges.

The most frequent response from the interviewees was that they did not expect to see major changes in their organisation after the project, since people or systems must change first. Many stressed the awareness of the importance and use of AI in the organisation, or the awareness of the importance and use of SEL in the organisation, the awareness of the value of relationships, or the need to improve relationships in the organisation, and that there is a need for integration of SEL across the education vertical.

> *"The role of SEL is to (…) create a climate to dare, to trust, to help each other learn how to overcome prejudices against and fears of AI". (P-7).*

Table 4: Use and development of skills and equipment in future work and life

Theme	Categories	Codes
Potential for further use and development	awareness	not much will change in the beginning, people must change first we can expect change when the system changes awareness of the importance and use of AI in the organisation awareness of the importance and use of SEL in the organisation awareness of the value of relationships improving relationships in the organisation is needed the role of the CSE is to create a climate in the school to dare, to trust, to help each other to learn overcoming prejudice against and fears of AI integrating SEL into AI
	improving existing activities	enriching the content of existing programmes (3) making it easier for all stakeholders and organisations to work together (2) transferring AI and SEL knowledge into daily activities creativity in the implementation of activities (interactive games, digital stories for conflict resolution, expression of emotions) some will use AI, others will fear it small steps in organisation strong focus on SEL (relationships, courses, training, workshops) the transfer of AI skills is left to the initiative of the individual
	new usage	putting what you have learned into practice (AI teacher prompts) knowledge transfer and sharing positive experiences involvement in the formal development of AI guidelines SEL is long-term learning equipment should be engaging help with the weaknesses of AI
	challenges of the future	there will be less work testing AI and assessing individual values on an ongoing basis (too) rapid development of AI, we won't be able to wait for the system teachers testing whether something is useful or harmful, warning ... concern about unethical use of AI

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions – a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

143

As a way forward, representatives most frequently mentioned content enrichment for the programmes they already run, facilitating collaboration between all stakeholders, translating AI and SEL knowledge into everyday activities, involving creativity in the delivery of activities (interactive games, digital stories for conflict resolution, expressing emotions, etc.). They highlighted the awareness that fear, especially of AI, will still exist, but small steps in the organisation are needed, along with considerable emphasis on SEL (relationships, courses, training, and workshops), and the transfer of AI knowledge is left to the initiative of individuals for the time being.

> *"The results, and in particular the knowledge I am gaining from the project, are currently being transferred, mainly in the form of enriching the content of the programmes we are already running" (P-7).*

Innovations mentioned included putting what has been learnt into practice, sharing examples of good practice, developing guidelines for the use of AI, the long-term nature of SEL, and having SEL help with the weaknesses of AI. They also stressed the importance of making the equipment interesting.

> *"I must say that in our institution we have started talking about AI and SEL. Some changes are happening already and will be happening for--I don't know--5-10 years. It depends how our, my colleagues will change, or how they will accept change" (P-8).*

The representatives see the biggest challenge as the amount of work, which they believe will not decrease and that the lack of regulation in the field of AI will reflect on the values of the individuals. Given the rapid development of AI, there will be no time to wait for the system to change, but teachers themselves will have to test whether something is useful or harmful, and to warn and care about the ethical use of AI.

3   Discussion

The integration of AI in education, as explored through the SETCOM project, presents a multifaceted challenge characterized by emotional responses, workload considerations, and ethical dilemmas. These factors were revealed through the participants perceptions on the project's progress. The synthesis of findings provides

a comprehensive insight into how these key factors influence participants' engagement, experiences, expectations, and the implementation of project activities within educational settings. The three main factors discovered in the projects are briefly highlighted below.

3.1 Emotional responses: the heart of change

Participants in the SETCOM project expressed a range of emotional responses to AI, from fear and apprehension to gratitude and joy. These emotions play a crucial role in the adoption and effective utilization of AI in education, influencing the overall climate within educational institutions. The impact of individual emotions on the collective workplace atmosphere, as noted by Totterdell et al. (1998), underscores the importance of addressing emotional dynamics proactively. Strategies to mitigate apprehensions about AI include raising awareness about AI's potential and limitations, emphasizing the value of SEL for ethical AI utilization, and fostering conditions for gradual changes within the educational community (Lipovec & Flogie, 2023).

3.2 Workload considerations: balancing innovation with capacity

The SETCOM project participants highlighted the increased workload associated with integrating AI into educational practices, echoing concerns over the need for technical support and the challenge of staying alongside of rapid advancements in AI technology. This observation aligns with broader educational experiences, where educators grapple with balancing innovative demands with existing responsibilities (Gartner, Krašna, & Lipovec, 2023). Effective strategies for managing this balance include providing comprehensive technical and professional development support, as advocated by change management and organizational behaviour research (Košir, 2012; Kotter, 2012). These strategies facilitate educators' adaptation to new technologies, ensuring that AI serves as an enhancement rather than a burden.

3.3 Ethical concerns: navigating the moral landscape

Ethical considerations are paramount in the deployment of AI within educational contexts. The SETCOM project participants, along with broader educational stakeholders, have raised concerns over data privacy, bias in AI algorithms, and

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

145

equitable access to AI resources (Gartner, Krašna, & Lipovec, 2023). The development and enforcement of ethical standards for AI use in education are crucial for safeguarding students' rights and promoting inclusivity. The European Commission's introduction of the first EU regulatory framework for AI highlights the importance of classifying AI systems based on the risks they pose, including specific considerations for educational applications (Artificial Intelligence Act: deal on comprehensive rules for trustworthy AI, 2023). This regulatory approach serves as a foundation for responsible AI implementation, emphasizing the need for ongoing dialogue and policy development to address ethical challenges in AI use.

3.4 Limitations and future directions

In exploring the integration of AI in educational settings, the SETCOM project, along with corroborative findings from across the educational technology landscape, has identified several limitations and challenges that warrant careful consideration. A primary limitation highlighted in this article revolves around the readiness and adaptability of educational institutions and educators to fully embrace and effectively utilize AI technologies. This challenge is not unique to the SETCOM project but is echoed by educational researchers globally who point out the varying levels of digital literacy among teachers and institutional readiness as significant barriers to the successful adoption of AI in education (Szostak, 2013).

The interoperability of AI systems with existing educational infrastructure and curricula also presents a notable limitation. The study findings highlighted the challenge of seamlessly integrating AI tools into established educational practices. This is a common theme in the wider discourse on AI in education, where the compatibility of AI technologies with current educational software and platforms, as well as their alignment with curriculum objectives, remains an open issue.

Furthermore, the emotional and psychological impact of integrating AI into education cannot be overlooked. Our group interview with SETCOM project partners sheds light on the mixed emotional responses from educators and students, ranging from excitement and curiosity to fear and resistance. These emotional dynamics are indicative of the broader ambivalence within the educational

community towards AI, underscoring the need for targeted professional development and support systems to address these concerns.

In conclusion, the limitations identified by our study, along with those recognized by educational technologists and researchers worldwide, underscore the multifaceted challenges of integrating AI into education. Addressing these challenges requires a concerted effort from policymakers, educators, and technology developers to ensure that AI technologies enhance rather than hinder the educational experience. As we navigate these limitations, the potential of AI to foster innovative learning environments remains an exciting prospect, promising to reshape the educational practice for future generations.

4 Conclusions

The results of our study shed light on the understanding and practical application of the interplay between AI and SEL in educational settings across educational vertical. The views of SETCOM project partners expressed the importance of participation in the project, the importance of the organizational and content structure of the project, the applicability of the project outcomes and opportunities for further activities and gradual introduction of changes in educational practice.

The SETCOM project provides a finetuned exploration of the challenges and opportunities presented by the integration of AI into education. By thoroughly addressing emotional dynamics, supporting educators in managing workload, and prioritizing ethical considerations, the educational community can navigate the complexities of AI adoption. Further studies are needed to address the holistic approach of AI technologies that enhance the educational experience, and fostering an environment where innovation and human-centric values coalesce to enrich teaching and learning for all stakeholders.

A. Kozmus, M. Krašna, J. Zurc: "The Experiences Are Beyond Our Expectations": Changing the Culture of Artificial Intelligence and Social and Emotional Learning in Educational Institutions − a Qualitative Evaluation Among Representatives of the SETCOM Project Partners

147

References

Ackerman, R., & Thompson, V. (2014). Meta-reasoning: What can we learn from meta-memory? In A. Feeney, & V. Thompson (Eds.). *Reasoning as Memory.* Hove, UK: Psychology Press.

Adam, F., Hlebec, V., Kavčič, M., Lamut, U., Mrzel, M., Podmenik, D., Poplas Susič, T., Rotar Pavlič, D., & Švab, I. (2012). Kvalitativno raziskovanje v interdisciplinarni perspektivi. Ljubljana: Inštitut za razvojne in strateške analize.

Artificial Intelligence Act: Deal on comprehensive rules for trustworthy AI (9. 12. 2023). European Commission.

Bakračevič Vukman, K., & Licardo, M. (2010). How cognitive, metacognitive, motivational, and emotional self-regulation influence school performance in adolescence and early adulthood. *Educational Studies* 36(3), 259-268. https://doi.org/10.1080/03055690903180376

Firth, J. A., Torous, J., & Firth, J. (2020). Exploring the impact of internet use on memory and attention processes. *International Journal of Environmental Research and Public Health* 17(24), 9481. https://doi.org/10.3390/ijerph17249481

Gartner, S., & Krašna, M. (2023). Etika umetne inteligence v izobraževanju. *Revija za elementarno izobraževanje* 16(2), 221-237. https://journals.um.si/index.php/education/article/view/2846/2211

Hunt, M. G., Marx, R., Lipson, C., & Young, J. (2018). No more FOMO: limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology* 37(10), 751–768. https://doi.org/10.1521/jscp.2018.37.10.751

Klemenčič, S., & Hlebec, V. (2007). *Fokusne skupine kot metoda presojanja in razvijanja kakovosti izobraževanja*. Ljubljana: Andragoški center Slovenije.

Košir, K. (2013). Socialni odnosi v šoli. Maribor: Subkulturni azil, zavod za umetniško produkcijo in založništvo. http://www.ljudmila.org/subkulturni-azil/front/img/admin/file/frontier/Kosir_Katja_-_Socialni_odnosi_v_soli.pdf

Kotter, J. P. (2012). Leading change: Why transformation efforts fail. *Harvard Business Review*. file:///C:/Users/Andreja/Downloads/Leading_Change_With_a_New_Preface_by_the.pdf

Kozmus, A., & Pšunder, M. (2022). Problemi in dileme povezane s spletnim nasiljem. In T. Štemberger, et al. (Eds.). *Constructing innovative learning environments* (pp. 125-138). Koper: Založba Univerze na Primorskem. https://www.hippocampus.si/ISBN/978-961-293-139-1.pdf

Kozmus, D., & Kozmus, A. (2023). Pomen urjenja spomina v informacijsko-komunikacijski dobi: zakaj kljub obilici informacij ostaja spomin ključnega pomena za posameznika. *Uporabna psihologija* 2. https://365544.8b.io/page4.html

Lipovec, A., & Flogie, A. (2023). Empowering future teachers: Unveiling their attitudes and knowledge about AI in Slovenian K-12 education. In 12th Mediterranean Conference on Embedded Computing (MECO), 6-10 June 2023, Budva, Montenegro, 1-4. https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10155010

Shneiderman, B. (2020). Human-centered artificial intelligence: Three fresh ideas. *AIS Transactions on Human-Computer Interaction* 12(3), 109-124. https://doi.org/10.17705/1thci.00131

Szostak, R. (2013). Research skills for the future: An interdisciplinary perspective. *Journal of Research Practice* 9(1). https://www.researchgate.net/publication/290579354_Research_Skills_for_the_Future_An_Interdisciplinary_Perspective

Totterdell, P., Kellett, S., Teuchmann, K., & Briner, R. B. (1998). Evidence of mood linkage in work groups. *Journal of Personality and Social Psychology* 74(6), 1504-1515. https://www.researchgate.net/publication/228079922_Evidence_of_mood_linkage_in_work_groups

Valkenburg, P. M. (2022). Social media use and well-being: What we know and what we need to know. *Current Opinion in Psychology* 45, 101294. https://doi.org/10.1016/j.copsyc.2021.12.006

Vršnik Perše, T., Kozina, A., Vidmar, M., Veldin, M., Pivec, T., Mlekuž, A., & Štremfel, U. (2020). Teachers' social, emotional and intercultural competencies: predictive value for job satisfaction. *Sodobna pedagogika* 137(3), 208-225. https://www.sodobna-pedagogika.net/arhiv/nalozi-clanek/?id=1723

Wang, Q. (2022). Memory online: introduction to the special issue. *Memory* 30 (4), 369-374. https://doi.org/10.1080/09658211.2022.2065306

Weissberg, R. P., Durlak, J. A., Domitrovich, C. E., & Gullotta, T. P. (2015). Social and emotional learning: Past, present, and future. In J. A. Durlak, C. E. Domitrovich, R. P. Weissberg, & T. P. Gullotta (Eds.). *Handbook of social and emotional learning: Research and practice* (pp. 3-19). New York, NY: Guilford Press.

World Health Organization. (2014). Mental health: A state of well-being. https://www.who.int/features/factfiles/mental_health/en/

Yang, S. J. H., Ogata, H., Matsui, T., & Chen, N. (2021). Human-centered artificial intelligence in education: Seeing the invisible through the visible. *Computers and Education: Artificial Intelligence* 2. https://doi.org/10.1016/j.caeai.2021.100008

Zurc, J. (2021). Fokusna skupina s študenti tutorji: samoevalvacijska študija. Maribor: Filozofska fakulteta UM. https://ff.um.si/wp-content/uploads/KOK-FF-UM_Fokusna_skupina_porocilo_ZurcJoca.pdf

Zurc, J. (2022). Fokusna skupina s predstavniki strokovnih služb Filozofske fakultete Univerze v Mariboru: samoevalvacijska študija. Maribor: Filozofska fakulteta UM. https://ff.um.si/wp-content/uploads/Priloga-4-Poro%C4%8Dilo-fokusne-skupine-strokovni-sodelavci-2020_2021.pdf

Zurc, J. (2023). Fokusna skupina kot metodološki pristop v evalvaciji in zagotavljanju kakovosti visokošolskega izobraževanja. In A. Mlekuž, I. Žagar (Eds.). Raziskovanje v vzgoji in izobraževanju: Izobraževanje učiteljic in učiteljev za raziskovalno učenje in poučevanje. 8. znanstvena konferenca (pp. 39-40). Ljubljana: Pedagoški inštitut. https://www.pei.si/wp-content/uploads/2023/09/1_zbornik_cel_2023.pdf

Zurc, J., & Ferligoj, A. (2023). Integracija kvantitativne in kvalitativne metodologije v družboslovnem raziskovanju. In A. Istenič, et al. (Eds.). *Upbringing and education between the past and the future* (pp. 511-528). Koper: Založba Univerze na Primorskem. https://www.hippocampus.si/ISBN/978-961-293-255-8.pdf

Connecting AI and SEL: A New Approach in Teacher Education

Alenka Lipovec

Univetrsity of Maribor, Faculty of Education, Maribor, Slovenia
alenka.lipovec@um.si

The study addresses the critical need for artificial intelligence (AI) literacy in teacher education and explores the most effective methods of equipping teachers in this emerging field, suggesting that a combination of AI literacy and Social-Emotional Learning (SEL) could substantially boost digital proficiency beyond conventional training approaches. The research employs quantitative analysis, initially surveying 571 pre-service and in-service teachers, and following up with 252 participants after a 12-hour course. The study utilized various self-reporting and standardized instruments to assess the programme's effectiveness. Notably, the effect size for self-reported competence in AI integration within teaching practices was found to surpass Hattie's hinge point twice, underlining its substantial impact on educational outcomes. Other measures, though slightly less striking, also achieved increases in digital competences surpassing other similar studies. This highlights the potential of combining AI literacy with SEL in teacher education to elevate digital competence effectively.

University of Maribor Press

POVEZOVANJE UI IN SEL: NOV PRISTOP V IZOBRAŽEVANJU UČITELJEV

ALENKA LIPOVEC
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
alenka.lipovec@um.si

Prispevek razpravlja o ključni potrebi po znanju s področja umetne inteligence (UI) v izobraževanju učiteljev ter raziskuje najučinkovitejše načine usposabljanja učiteljev na tem področju. Trdimo, da kombinacija UI pismenosti in socialno-čustvenega učenja (SEL) presega tradicionalne metode izobraževanja učiteljev na digitalnem področju. Uporabljena je bila kvantitativna metodologija, pri čemer je bilo najprej anketiranih 571 učiteljev pred začetkom programa, po 12-urnem programu pa je sledila anketa z 252 udeleženci. V študiji so bili za oceno učinkovitosti programa uporabljeni različni inštrumenti samoporočanja in standardizirani instrumenti. Ugotovili smo, da je velikost učinka samoocene usposobljenosti za vključevanje umetne inteligence v učne prakse po zaključenem programu dvakrat presegla Hattiejevo točko preloma. Tudi pri drugih ukrepih, čeprav nekoliko manj očitno, je bilo doseženo izboljšanje digitalnih kompetenc, ki je preseglo druge podobne študije. Rezultati torej podpirajo potencial združevanja UI pismenosti in SEL v izobraževanju učiteljev za učinkovito dvigovanje digitalnih kompetenc.

Univerzitetna založba
Univerze v Mariboru

1   Introduction

The contemporary landscape of education is undergoing a significant transformation, driven by the integration of advanced technologies such as artificial intelligence (AI). AI is increasingly recognized for its capacity to tailor learning experiences to individual needs, thereby enhancing the effectiveness and efficiency of education. This technology's adaptive learning capabilities are paving the way for more personalized educational approaches, which have shown to substantially boost student performance. These advancements, as highlighted by Chiu et al. (2023), reflect the potential of AI to revolutionize traditional teaching methodologies. Artificial intelligence in education (AIEd) refers to the application of AI technologies, such as chatbots, automatic marking systems, intelligent tutoring systems, and student performance prediction platforms that support and enhance education (Chiu et al., 2023). To ensure the effective functioning of future society, teacher education must include AI literacy, which is usually defined as "… a set of competencies that enable individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool online, at home and in the workplace" (Long & Magerko , 2020). A recent OECD study reports "implications for employment and education" and "highlights the need to strengthen the foundation skills of the workforce and prepare it to work together with AI" (OECD, 2023). Recent studies have focused on identifying teachers' AI content knowledge and desired students' learning outcomes, providing guidelines for schools to design and deliver their AI curricula.

However, the integration of AI into educational settings is not without its challenges. As noted by Zhai et al. (2021), educators and institutions face a myriad of technical hurdles and ethical dilemmas when implementing AI. These challenges range from overcoming the limitations of current technologies to addressing the ethical implications of AI in education.

In response to these evolving needs, the SETCOM intervention has been developed to strategically integrate AI literacy with social-emotional learning (SEL). This approach is not merely about incorporating new technology into the classroom, it is about redefining the educational process to incorporate a comprehensive understanding of AI, underscored by the principles of SEL. By intertwining AI literacy with SEL, SETCOM proposes a method that enhances educators' digital

competencies while fostering a deeper, more empathetic understanding of AI. This method goes beyond the technical aspects of AI, delving into its impact on human emotions, social interactions, and ethical considerations.

At the heart of SETCOM's philosophy is the belief that education should be human-centric, focusing on the role and attitudes of educators as pivotal elements in the learning process. It advocates for the responsible use of AI, encouraging positive attitudes towards technology among both educators and learners. This approach aligns with the findings of Durlak et al. (2011), who have demonstrated the significant impact of SEL on academic success. The SETCOM programme at the University of Maribor provides a unique opportunity to explore this intersection. The central hypothesis suggests that integrating SEL with AI literacy may significantly enhance the digital competencies of educators, particularly emphasizing the transformative influence of educators' attitudes towards technology in this integrative process.

This research delves into how the SETCOM programme's unique approach impacts the digital and intra- and interpersonal competencies of pre-service and in-service teachers. It examines the extent to which the programme's focus on AI literacy and SEL contributes to a more comprehensive understanding and adeptness in digital skills. Additionally, the study explores the dynamic interplay between educators' attitudes towards technology and their ability to assimilate and apply these integrated skills in educational settings. The findings of this research provide valuable insights into the development of future teacher training programmes, ensuring they are well-equipped to meet the demands of a technology-driven educational landscape.

1.1   SETCOM Intervention Programme

The SETCOM intervention, intricately designed in alignment with the guidelines set forth by the European Commission in Artificial Intelligence and Education (Holmes in drugi, 2022), is structured into three distinct yet interconnected strands: ABOUT, WITH, and FOR. This comprehensive structure aims to offer a holistic approach to integrating AI literacy and SEL in the education of future teachers.

ABOUT Strand: Technological Dimension of AI Literacy. The ABOUT strand serves as the foundational layer of the programme, introducing pre-service teachers to the fundamental aspects of AI and SEL. This includes an overview of the CASEL model, which is pivotal in understanding the socio-emotional aspects in educational contexts. The strand delves deep into AI technologies, techniques, and concepts, providing a robust technological grounding. This phase of the intervention is crucial in building a solid base of AI literacy, focusing on the technological dimension. The primary goal here is to ensure that future educators are well-versed in the basics of AI, its potential applications, and the ethical considerations involved.

WITH Strand: Didactical Dimension of AI Literacy. The WITH strand takes a more applied approach, focusing on the practical integration of AI and SEL within teaching methodologies. It showcases various tools and methods that enhance the learning experience, including specialized support for learners with disabilities and the optimization of administrative tasks in educational settings. An innovative aspect of this strand is the incorporation of learning analytics and data mining, which, while not strictly AI, involves similar data analysis and analytical techniques used in AI-driven learning tools. This strand also includes an exploration of how AI can be used to understand and improve learning processes, as evidenced by the work of Drožđek & Pesek (2024) in reinforcement learning for teaching multiplication tables. The WITH strand is thus characterized as the didactical dimension of AI literacy, where the emphasis is on applying AI and SEL principles in an educational context.

FOR Strand: Human Dimension of AI Literacy. The FOR strand, referred to as AI literacy's human dimension in educational literature, is forward-looking and prepares educators for future integration of AI into teaching and learning environments. It emphasizes developing skills critical for the ethical use and understanding of AI, such as prompt engineering and ethical considerations. This strand is pivotal in equipping future educators with the competencies needed to navigate the evolving landscape of AI in education, focusing on the human-centred aspects of technology use.

Each of these strands comprises four lessons, with a balanced mix of lectures and hands-on workshops. Such a structure allows for both theoretical understanding and practical application, providing a comprehensive learning experience for pre-service teachers. The intervention's design reflects a commitment to developing well-

rounded educators who are not only technically proficient in AI but also adept in integrating SEL into their teaching practices. This approach aligns with the broader objective of enhancing digital competence in educators, as outlined in the DigComp 2.1 framework (Carretero Gomez in drugi, 2017) and DigCompEdu (Redecker, 2017), ensuring that future teachers are prepared to effectively navigate and contribute to the digital transformation of education.

2   Methodology

This research delved into how the SETCOM programme's unique approach impacts the digital competencies of pre-service teachers. It examined the extent to which the programme's focus on AI literacy and SEL contributed to a more comprehensive understanding and adeptness in digital skills. Additionally, the study explored the dynamic interplay between educators' attitudes towards technology and their ability to assimilate and apply these integrated skills in educational settings. The findings of this research provided an insight into the development of future teacher training programmes, ensuring they are well-equipped to meet the demands of a technology-driven educational landscape.

The following research question has been formulated: How does the integration of SEL and AI literacy within the SETCOM programme at the University of Maribor influence the development of digital and inter-/intrapersonal competencies in education?

To address this question, methods of quantitative empirical pedagogical research in a longitudinal context have been used.

2.1   Instrument

The anonymous questionnaire consisted of three sections of questions: a) demographics, b) Artificial Competence Literacy: two knowledge self-reporting items, General Attitudes towards AI Scale – GAAIS (Schepman & Rodway, 2020), Attitudes towards the Ethics of AI – AT-EAI (Jang in drugi, 2022) and Competence Framework for Citizens DigComp 2.1 (Carretero Gomez in drugi, 2017); and c) two knowledge self-reporting items and Brackett et al. questionnaire (2012) assessing participants' beliefs about SEL.

The knowledge self-reporting items were designed for the purposes of this study and were as follows:

AI1: I am very familiar with the term artificial intelligence.
AI2: I feel fully competent to use AI in teaching.
SEL1: I am very familiar with the term socio-emotional competence.
SEL2: I feel fully competent to develop social-emotional competences in teaching.

All items except the DigComp2.1 items were designed on a five-level Linkert scale with the following response options: strongly disagree, disagree, neutral, agree, and strongly agree. Questions from section (b) DigComp 2.1 were answered by agreeing with the proficiency levels on an eight-level scale, measured with complexity of tasks and autonomy: (1) simple tasks, with guidance, (2) simple tasks with autonomy, with guidance when needed, (3) well-defined and routine tasks, and straightforward problems, on my own, (4) tasks, and well-defined and non-routine problems independently, according to my needs, (5) different tasks and problems, guiding others, (6) most appropriate tasks, able to adapt to others in a complex context, (7) resolve complex problems with limited solutions, integrate to contribute to the professional practice and to guide others, (8) resolve complex problems with many interacting factors, propose new ideas and processes to the field.

2.2   Sample

The SETCOM intervention involved a diverse group of participants, including pre-service teachers from kindergartens, elementary, and secondary school levels, as well as in-service teachers from kindergartens through to high school. The intervention saw a substantial participation rate, with 571 individuals completing the initial questionnaire and 252 completing the final questionnaire.

A notable characteristic of both the initial and final participant groups was the predominance of female participants, who constituted 80% of each sample. There was, however, a significant difference in the average age of participants between the two samples. Initially, the average age was 31.5 years, but this decreased to 24.7 years in the final sample. This shift in average age can be attributed to the composition of the participants: in the initial sample, 59% were pre-service teachers, with the

remainder being in-service teachers. By contrast, in the final sample, a higher proportion, 86%, were pre-service teachers.

The structure of the sample and the nature of the questionnaire likely influenced the difference in response rates between pre-service and in-service teachers. While pre-service teachers completed the questionnaire during their course, in-service teachers did so in their own time, which might explain the lower completion rate among the latter group.

Participants were engaged in different segments of the programme, with 29% actively participating in one strand, 23% in two strands, and a notable 48% participating in all three strands. These strands, labelled ABOUT, WITH, and FOR, each focused on different aspects of the intervention, offering a comprehensive approach to the topics covered.

2.3   Data Gathering and Data Analysis

The SETCOM intervention programme was structured in a way to accommodate the varied schedules and academic commitments of its participants, particularly the pre-service teachers. The process of collecting initial state data commenced in October 2022 and continued through January 2023. This initial phase was crucial in establishing a baseline understanding of the participants' competencies and attitudes. Following this, the data collection for the final state was conducted over a more extended period, from February 2023 to December 2023. This extended period allowed for a thorough and comprehensive assessment of the intervention's impact over time.

The duration of the intervention for each pre-service teacher was quite variable, ranging approximately from 5 to 12 months. This variation was influenced by several factors related to the academic calendar and the specific curriculum of the participants. For instance, whether the intervention was integrated into a subject that was taught in the winter or summer semester played a significant role. Additionally, the possibility of following a cohort into the next academic year also contributed to the variation in the intervention's length across different sub-samples of pre-service teachers.

The analysis of the data was carried out using the 1KA online analysis tool. This involved a comparative study of the results from both the initial and final states of the intervention. Such a comparison was critical in quantifying the impact of the SETCOM programme.

To calculate the SETCOM effect in terms of percentage, the following formula was used:

$$\frac{\overline{(x_{final} - \bar{x}_{initial})}}{range} \cdot 100.$$

In this calculation, a range of 5 was consistently applied across all assessments, except for DigComp2.2, where a range of 8 was used to accommodate its broader scale.

Furthermore, the effect size, a crucial measure of the intervention's impact, was determined using Cohen's d. This statistical tool is represented by the formula:

$$d = \frac{\overline{(x_{final} - \bar{x}_{initial})}}{\sqrt{\frac{SD^2_{final} + SD^2_{initial}}{2}}}).$$

Cohen's d provided a standardized measure of the effect, offering a clear and objective insight into the magnitude of the intervention's impact on the participants. This meticulous approach to analysis ensured that the findings were both reliable and meaningful, providing a robust assessment of the SETCOM programme's effectiveness.

2.4   Limitations

The study in question presents a set of limitations that need to be acknowledged for a comprehensive understanding of its outcomes. One of the primary constraints is the diverse nature of the participant group. This heterogeneity is evident in the varying backgrounds of the participants, such as computer science teachers, primary teachers, or STEM, social science, art or humanities teachers. In our sample, primary pre-service teachers prevailed, followed by social science teachers, and less than one-tenth of the sample consisted of (future) STEM teachers. While this diversity

enriched the data, it also complicated the process of drawing generalized conclusions, especially when comparing across different teaching specializations. The gender distribution within the sample also presents a notable limitation. The predominance of one gender over another can lead to skewed results, particularly when analysing aspects of the study that may vary significantly between genders. This imbalance could affect the study's findings, especially in areas where gender differences are known to play a crucial role. One such area is technology. While various studies have yielded inconsistent results regarding gender differences in technology use and perception in education, a notable meta-analysis by Cai, Fan, and Du (2017) brought some clarity to this area. Their comprehensive review confirmed the mixed nature of previous findings but importantly highlighted that men generally tend to have more favourable attitudes towards technology. Additionnalyy, the longitudinal design, while thorough, resulted in a significant drop-off in participant numbers from the initial to the final questionnaire, potentially affecting the results' reliability and representativeness. Next, the reliance on self-report measures for evaluating knowledge and competencies might introduce bias, as participants could overestimate their abilities or the intervention's impact. Lastly, the length of the questionnaire poses its own set of challenges. With an approximate completion time of 15-20 minutes, there is a concern that the latter sections of the questionnaire, particularly those focusing on SEL, might not have been answered with the same level of attention or reflective thought as the earlier sections, which were primarily AI-focused. This variation in response attentiveness may have led to inconsistencies in the data quality across different sections of the questionnaire.

3   Results

First, results for knowledge self-reporting items (5-level scale) are reported in Table 1. The results regarding standardized questionnaires are shown in Table 1 in the form $\bar{x} \pm \sigma$, where $\bar{x}$ denotes average, and standard deviation is marked by σ.

Table 1 highlights the effect sizes for two main areas: AI and SEL. In the AI domain, the effect sizes indicated a significant impact of the intervention. Familiarity with AI showed a notable effect size of 0.44, while the ability to use AI in teaching exhibited an even more substantial impact, with an effect size of 0.88. For SEL, the results also demonstrated a positive influence. The effect size for socio-emotional competence stood at 0.31, and for developing socio-emotional competences in

teaching, it was 0.34. These figures collectively suggest that the intervention was particularly effective in enhancing skills related to AI, with a strong influence also seen in the SEL competencies.

Table 1. Self-reporting items

	I am very familiar with the term …		I feel fully competent to …	
	artificial intelligence.	socio-emotional competence.	use AI in teaching.	develop social-emotional competences in teaching.
Initial state	3.4 ± 0.86	3.5 ± 0.83	2.7 ± 0.92	3.3 ± 0.87
Final state	3.8 ± 0.69	3.8 ± 0.61	3.4 ± 0.85	3.6 ± 0.71
Effect (%)	8	6	14	6
Effect size	0.44	0.31	0.88	0,34

The outcomes from several standardized assessments are comprehensively detailed in Table 2. This includes the Competence Framework for Citizens DigComp 2.1, developed by Carretero Gomez et al. in 2017, which provides a structured analysis of digital competencies. Additionally, the table includes results from the General Attitudes towards AI Scale – GAAIS, formulated by Schepman & Rodway in 2020, and the Attitudes towards the Ethics of Artificial Intelligence – AT-EAI, researched by Jang et al. in 2022. Furthermore, insights into participants' beliefs about SEL were gathered using the Brackett et al. questionnaire from 2012, offering a deeper understanding of their perspectives in these critical areas.

Table 2. SETCOM impact on standardized questionnaires

	DigComp2.2	GAAIS	AT-EAI	Brackett et al. SEL
Initial state	4.45 ± 1.90	3.16 ± 1.23	3.85 ± 1.13	3.83 ± 0.76
Final state	4.98 ± 1.81	3.32 ± 1.10	3.91 ± 1.10	3.86 ± 0.75
Effect (%)	6.6	3.2	1.5	0.8
Effect size	0.40	0.19	0.08	0.06

In Table 2, the SETCOM programme's impact on standardized questionnaires is grouped into two categories: AI-related Competencies (DigComp2.2, GAAIS, AT-EAI) and Socio-Emotional Learning (SEL) – Brackett et al. (2012). There was an observable improvement in AI-related competencies. The effect sizes for DigComp2.2, GAAIS, and AT-EAI were 0.40, 0.19, and 0.08, respectively. These

figures indicate a moderate to slight enhancement in participants' digital and AI-related competencies and attitudes. The SEL competency, assessed by the Brackett et al. questionnaire, showed a marginal increase with an effect size of 0.06. It is obvious that in SEL domain almost no progress was observed. One of the reasons could be that participants felt more confident in this domain already at the beginning of the intervention since only 3% totally disagreed or disagreed with the statement *I am confident in my ability to support social and emotional learning in school settings.* This pre-existing confidence could mean that there was less perceived room for improvement in SEL compared to digital competencies. Additionally, digital skills might have been a newer or less familiar area for participants compared to SEL, making the learning curve steeper and the noticeable progress more significant in digital areas.

Unfortunately, attitudes toward the ethics of AI improved only by 1.5 %. A detailed analysis showed that one statement in AT-EAI showed no difference between the initial and final states, in three statements lower agreement on the level -0.1 or -0.2 (on a 5-level scale) was recorded, and in six statements higher agreement on the level 0.1, 0.2 or 0.3 was recorded. The highest shift was recorded with respect to the statement favouring regulation *(In the case of problems caused by AI, it is difficult to determine exactly who is responsible, so there needs to be a social consensus on who should compensate and how.)*

4   Discussion

The results of the SETCOM intervention programme are not only promising but also indicative of significant effectiveness in enhancing digital competencies, especially in the realm of pedagogical AI competence. This is underscored by the remarkable effect sizes noted in the study. For the standardized DigComp2.1, the effect size closely approaches the influential benchmark set by Hattie in 2023, known as Hattie's (2023) hinge point, which stands at 0.40. This already suggests a substantial impact of the programme.

Even more impressive is the effect size of 0.44 observed for self-reported knowledge about AI. This indicates that the intervention has been particularly effective in boosting participants' understanding and awareness of AI, which is a crucial aspect of modern digital literacy. The highlight, however, is the staggering effect size of 0.88 measured for self-reported efficiency in AI use in teaching. Such a high effect

size is practically meaningful, pointing to a profound improvement in the skills and confidence of educators in integrating AI into their teaching practices.

Given these compelling results, it is clear that the SETCOM intervention programme stands out as a substantial and impactful initiative. It effectively elevates general digital competencies and, more importantly, hones specific pedagogical AI skills.

Some other intervention programmes, e.g. Çebi et al. (Çebi et al., 2022) reported lesser improvement even though the intervention was much longer and designed around the DigComp2.1 framework. This difference highlights how important it is, in our opinion, to consider the social and emotional aspects when teaching digital skills. The importance of synergies of these two domains was also highlighted in the first phase of the intervention (Lipovec et al., 2023).

There are numerous other studies reflecting upon the DigComp 2.1 competence framework of educators, for a review, see Bilbao Aiastui et al. (2021). For instance, the results for secondary school teachers in Malaysia suggest that digital competence, according to DigComp 2.1, is highly significant in influencing workforce agility (Lim et al., 2021), where teachers' workforce agility refers to a flexible and well-trained workforce that can easily and quickly adapt to new situations and opportunities (Muduli & Pandya, 2018).

Notwithstanding the small progress in the SEL area, the results of this study offer empirical evidence that there is more progress in digital areas when SEL is included than when SEL is not included, like, for example, in the Turkish intervention (Çebi et al., 2022). Çebi et al. (2022) crafted a 46-hour training module for pre-service teachers in Turkey, aiming to bolster their digital competencies in technology assimilation. This programme's effect was smaller than those of the 12-hour SETCOM programme effect, for more details, see (Lipovec et al., 2024).

The positive effect of the SETCOM project in the AI ethics area is also reported in Krašna et al. (Krašna et al., 2024) who compared the data from the beginning of the project (October 2022) with the contemporary teachers' opinions. They report that over 70% of teachers have used AI services like ChatGPT, with the purpose of introducing AI to students and incorporating it into tasks. However, less than 30%

felt confident in evaluating AI responses, even though more than half have planned to use the AI system feedback to enhance their teaching methodologies. It is clear also in Slovenian settings that addressing the transformative effects of ChatGPT on the learning environment, and educating teachers and students alike about its capabilities and limitations, will be crucial in the future (2024).

It was reported (Lipovec & Flogie, 2023) that general attitudes towards AI were less favourable at the beginning of SETCOM intervention in October 2022 compared to the results for general population (Schepman & Rodway, 2020). The most striking differences were found in GAAIS item 1, where only 12% of our participants (47% for the general population) agreed that they prefer AI over humans in routine transactions. The second significant gap was found in item 14, where the agreement of future Slovenian teachers with claims about many beneficial applications of AI is 32,1% (86% for the general population). Applying the same methodology by combining (dis)agreement from the "strongly" and "somewhat" levels and retaining the neutral type, results showed that agreement with item 1 rose to 41%, and agreement with item 14 rose to 84%.

5   Conclusion

In the field of educational technology, Artificial Intelligence in Education (AIEd) is an emerging field that is projected to have a profound impact on the teaching and learning process. The AIEd has already been around for more than 30 years, but educators may still have concerns about scaling the pedagogical benefits of AIEd and how it could positively impact the teaching and learning process. After conducting a thorough review of existing literature, it became apparent that there is a notable gap in properly monitored and evaluated intervention programmes specifically focused on AIEd. While this precise area of research seems to be under-explored, there have been numerous calls underscoring the need for such studies, e.g. Falloon (2020). It is our aspiration that the current study contributes significantly towards bridging this gap, shedding new light on this vital aspect of educational research. Nonetheless, it's clear that this field still requires more extensive exploration and research to fully understand and harness the potential of learning intelligence in educational contexts.

As educational institutions increasingly adopt technology-centred teaching methodologies, there is a pressing need to understand how these modern approaches align with and enhance existing frameworks for assessing digital competence. Traditional methods of evaluating digital skills may not fully encapsulate the nuances introduced by new technologies like AI. The SETCOM programme, an innovative intervention at the University of Maribor, emerges as a critical case study in this regard. It aims to blend AI literacy, a burgeoning field in the digital landscape, with the principles of SEL, which focuses on developing emotional intelligence and social skills in educational settings.

The underlying premise of the research is that by melding AI literacy with SEL, the SETCOM programme could potentially elevate the digital proficiency of future teachers beyond traditional training methods. This hypothesis stems from the understanding that digital competence in the contemporary era entails not just technical know-how but also the ability to navigate the social and ethical dimensions of technology. Educators' attitudes towards technology, especially AI, play a crucial role in this context. Their perceptions, openness to integration, and overall stance towards AI and SEL could significantly influence the effectiveness of such interventions.

The SETCOM curriculum integrates AI's technological, didactic, and human dimensions with activities focused on empathy, emotional management, and decision-making skills. It combines practical AI tool usage with the application of SEL scenarios, equipping participants to create a comprehensive and empathetic learning environment. This approach aims to blend technological expertise with socio-emotional growth, showcasing a holistic educational model.

This study's findings are crucial for educational strategies, emphasizing the need for well-equipped classrooms and ongoing teacher development. They underscore the importance of adapting to rapid technological changes and addressing AI's ethical challenges in education. Future research should focus on navigating these ethical complexities to merge digital and personal competencies effectively, paving the way for a more human-centred approach to educational technology.

Acknowledgments

References

Bilbao Aiastui, E., Arruti , A., & Carballedo Morillo, R. (2021). A systematic literature review about the level of digital competences defined by DigCompEdu in higher education. *Aula abierta, 50(4)*, pp. 841-850. https://doi.org/https://doi.org/10.17811/rifie.50.4.2021.841-850

Brackett, M. A., Reyes, M. R., Rivers, S. E., Elbertson, N. A., & Salovey, P. (2012). Assessing Teachers' Beliefs About Social and Emotional Learning. *Journal of Psychoeducational Assessment, 30(3)*, pp. 219-236. https://doi.org/10.1177/0734282911424879

Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta analysis. *Computers & Education*, pp. 1-13. https://doi.org/https://doi.org/10.1016/j.compedu.2016.11.003

Carretero Gomez, S., Vourikari, R., & Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use.* Luxembourg: Publications Office of the European Union.

Çebi , A., Özdemir a, İlknur R, T. B., Reisoğlu, İ., & Çolak, C. (2022). From digital competences to technology integration: Re-formation of pre-service teachers' knowledge and understanding. *International Journal of Educational Research, 113*, p. 101965. https://doi.org/https://doi.org/10.1016/j.ijer.2022.101965

Chiu, T. K., Xia, Q., Zhou, X., Sing Chai, C., & Cheng, M. (2023). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Computers and Education:Artificial Inteligence, 4*, p. 100118. https://doi.org/https://doi.org/10.1016/j.caeai.2022.100118

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal Interventions. *Child Development, 82(1)*, pp. 405-432. https://doi.org/https://doi.org/10.1111/j.1467-8624.2010.01564.x.

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, pp. 1-24. https://doi.org/10.1007/s11423-020-09767-4

Gill, S. S., Xu, M., Patros, P., Wu, H., Kaur, R., Kaur, K., Fuller, S., Singh, M., Arora, P., Parlikad, A. K., Stankovski, V., Abraham, A., Ghosh, S. K., Lutfiyya, H., Kanhere, S. S., Bahsoon, R., Rana, O., Dustdar, S., Sakellariou, R., Uhlig, S., & Buyya, R. (2024). Transformative effects of ChatGPT on modern education: Emerging Era of AI Chatbots. *Internet of Things and Cyber-Physical Systems*, pp. 19-23. https://doi.org/https://doi.org/10.1016/j.iotcps.2023.06.002

Hattie, J. (2023). *Visible Learning: The Sequel A Synthesis of Over 2.100 Meta-Analyses Relating to Achievement.* Routlege.

Holmes, W., Persson, J., Chounta, I. A., & Dimitrova, V. (2022). *Artificial intelligence and Education. A critical view through the lens of human rights, democracy, and the rule of law.* https://rm.coe.int/artificial-intelligence-and-education-a-critical-view-through-the-lens/1680a886bd

Jang, Y., Choi, S., & Kim, H. (2022). Development and validation of an instrument to measure undergraduate students' attitudes toward the ethics of artificial intelligence (AT-EAI) and

analysis of its difference by gender and experience of AI education. *Education and Information Technologies*. https://doi.org/https://doi.org/10.1007/s10639-022-11086-5

Krašna, M., Arcet, B., & Gartner, S. (2024). Teachers' opinion about the application of AI in the education. *INTED2024 Proceedings, 18th annual International Technology, Education and Development Conference* (p. in press). Valencia, Spain. In press.: IATED Academy. https://doi.org/10.21125/inted.2024

Lim, Y. S., Halim, A. H., & Ramayah, T. (2021). Agile or not? The upsurge of digcomp and social media usage among teachers. *Journal of Applied Structural Equation Modeling, 5(2)*, pp. 1-21. https://doi.org/ 10.47263

Lipovec, A., & Flogie, A. (2023). Empowering future teachers : unveiling their attitudes and knowledge about AI in Slovenian K-12 education. *12th Mediterranean Conference on Embedded Computing (MECO), 6-10 June 2023*, (pp. 1-4). Budva, Montenegro. https://doi.org/10.1109/MECO58584.2023.10155010

Lipovec, A., Arcet, B., & Ferme, J. (2023). Connecting the Dots: Exploring the Correlation Between Socio-Emotional Learning Beliefs and Attitudes Toward Artificial Intelligence. In B. Aberšek, & M. Cotič (Eds.), *Challenges and Transformation of Education for 21st Century Schools* (p. in press). Cambridge Scholars Publishing.

Lipovec, A., Kaučič, B., & Arcet, B. (2024). Intersecting Evaluations: Digital Competence and AI Attitudes among Future Slovenian Educators. In M. Licardo, & A. Lipovec (Eds.), *Artificial Intelligence Literacy and Social-Emotional Skills as Transversal Competencies in Education* (pp. 28-58). Verlag dr. Kovač. In press.

Long, D., & Magerko , B. (2020). What is AI Literacy? Competencies and Design Considerations. *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, (pp. 1-16). https://doi.org/https://doi.org/10.1145/3313831.3376727

Muduli, A., & Pandya, G. (2018). Psychological Empowerment and Workforce Agility. *Psychological Studies*, pp. 276-285. https://doi.org/https://doi.org/10.1007/s12646-018-0456-8

OECD. (2023). *Is Education Losing the Race with Technology?: AI's Progress in Maths and Reading.* Paris: Innovation, OECD Publishing. https://doi.org/https://doi.org/10.1787/73105f99-en

Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu.* (Y. Punie, Ured.) Luxembourg: Publications Office of the European Union. https://doi.org/https://data.europa.eu/doi/10.2760/159770

Schepman, A., & Rodway, P. (2020). Initial validation of the general attitudes towards Artificial Intelligence Scale. *Computers in Human Behavior Reports, 1*, p. 100014. https://doi.org/https://doi.org/10.1016/j.chbr.2020.100014

Zhai, X., Chu, X., Chai, C. S., Yung Jong, M. S., Istenić, A., Spector, M., Liu, J. B., Yuan, J., & Li, Y. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. *Complexity*, 1-18. https://doi.org/ https://doi.org/10.1155/2021/8812542.

STEM IN EDUCATION
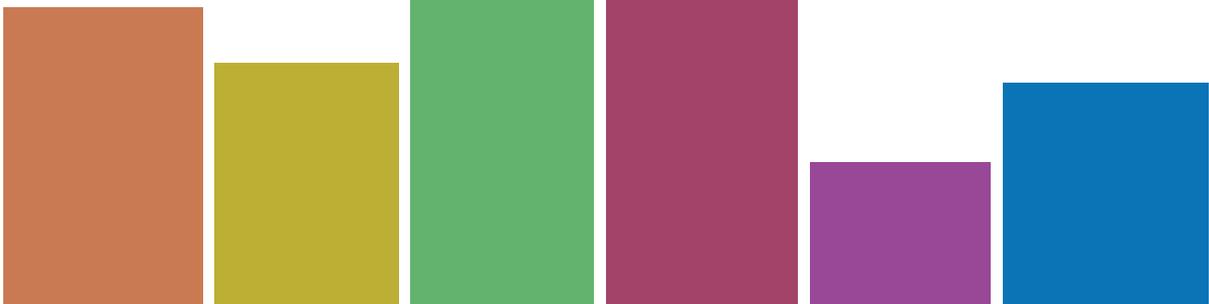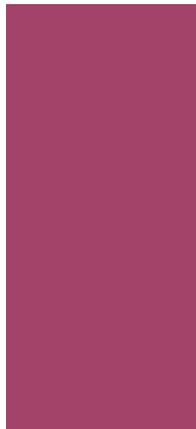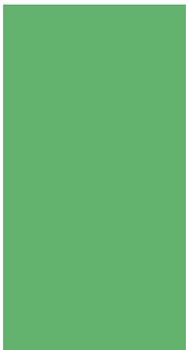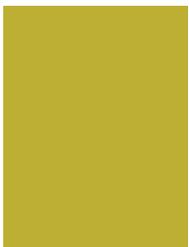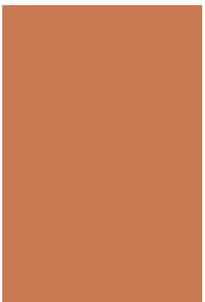
School Leaders as Promoters of Inclusive Digital Learning

Rita Bertozzi, Laura Landi
University of Modena and Reggio Emilia, Reggio Emilia, Italy
rita.bertozzi@unimore.it, laura.landi@unimore.it

Technological changes, development of key competences identified by the EU and OECD as crucial for citizens, together with the consequences of the Covid-19 pandemic, can be faced only through an ecological approach rooted in pedagogical leadership. The Covid-19 pandemic has generally boosted teachers' digital awareness and competence but there seems to be a lack of reflective practices on how digital technology can improve inclusive learning. School leaders are essential in involving and supporting the school community in the use of digital technology for inclusive learning. The Erasmus+ project ePRI4ALL has the aim to shape the digital pedagogical leadership attitudes. The partnership conducted ninety-nine in-depth semi-structured interviews with school leaders and experts in Spain, Greece, Italy and Poland. The thematic analysis highlighted challenges faced, resources available and professional development needs and grounded the learning materials developed (modules, MOOC and online app). This article will present the results for the 25 Italian interviews analyzing the role of digital education in school, the training needs of school leaders and the main challenges that they have to face in order to be promoters of an inclusive and digitally competent school.

University of Maribor Press

VODJE ŠOL KOT SPODBUJEVALCI VKLJUČUJOČEGA DIGITALNEGA UČENJA

RITA BERTOZZI, LAURA LANDI

Univerza v Modeni in Reggio Emiliji, Reggio Emilia, Italija
rita.bertozzi@unimore.it, laura.landi@unimore.it

S tehnološkimi spremembami, razvojem ključnih kompetenc, ki sta jih EU in OECD opredelila kot ključne za državljane, ter posledicami pandemije Covid-19 se je mogoče soočiti le z ekološkim pristopom, ki temelji na pedagoškem vodenju. Pandemija Covid-19 je na splošno povečala digitalno ozaveščenost in usposobljenost učiteljev, vendar se zdi, da primanjkuje refleksivnih praks o tem, kako lahko digitalna tehnologija izboljša vključujoče učenje. Vodstvo šole je ključnega pomena pri vključevanju in podpiranju šolske skupnosti pri uporabi digitalne tehnologije za vključujoče učenje. Cilj projekta Erasmus+ ePRI4ALL je oblikovati stališča digitalnega pedagoškega vodenja. V okviru partnerstva je bilo opravljenih devetindevetdeset poglobljenih polstrukturiranih intervjujev s šolskimi vodji in strokovnjaki v Španiji, Grčiji, Italiji in na Poljskem. Tematska analiza je izpostavila izzive, s katerimi se soočajo, razpoložljive vire in potrebe po strokovnem razvoju ter utemeljila razvito učno gradivo (module, MOOC in spletno aplikacijo). V tem članku bodo predstavljeni rezultati 25 italijanskih intervjujev, ki analizirajo vlogo digitalnega izobraževanja v šoli, potrebe vodij šol po usposabljanju in glavne izzive, s katerimi se morajo soočiti, da bi postali promotorji vključujoče in digitalno kompetentne šole.

1   Introduction

The Covid-19 pandemic has generally boosted teachers' digital awareness and competence but there seems to be a lack of reflective practices on how digital technology can improve inclusive learning. School leaders are essential in involving and supporting the school community in the use of digital technology for inclusive learning. With the aim of analysing the training needs of school principals and producing useful materials for the strengthening of their professional skills in this field, an Erasmus + project was implemented in the years 2022-2024 involving Italy, Spain, Greece and Poland. This Erasmus+ project, named 'ePRI4ALL. Open and digital resources for primary school principals to support inclusive education through online learning'[1], had the aim to shape the digital pedagogical leadership attitudes.

This article will present some of the findings from the research phase in Italy, placing them within a broader reflection that emerged from the analysis of the research results in the four countries involved[2].

1.1   School Leaders as driver of innovation

In the education field, there is a wide tradition of research on the role of teachers in relation to educational policies, particularly developed since the 1960s in sociological studies (Besozzi, 2017). From such studies, the ethical and professional tensions to which teachers are exposed and the strategies of preservation, reproduction and change of the social system emerge. It becomes evident how their professional experience develops thanks to spaces of autonomy delimited by relational, bureaucratic and organisational constraints (Argentin, 2018). It also follows that there is a difference in the roles that teachers assume: among these, Croll *et al.* (1994) identify that of "*policy maker in practice*" (in addition to those of partner, implementer or opponent of policies) emphasising how public policies cannot disregard the concrete traits they assume.

---

[1] For more information on the project see https://e-pri4all.erasmus.site/
[2] The article is the outcome of a highly cooperative effort by both authors. However, for Italian academic reasons, we state that Rita Bertozzi wrote sections 1, 2 and 4 and Laura Landi section 3.

Like teachers, school leaders also play a crucial role in the implementation of school policies and in the definition of the type of response individual schools give to emerging challenges. Assuming school leaders as street-level bureaucrats 'SLBs' (Lipksy, 1980), it is evident how they are at the centre of multilevel institutional pressures and called upon to take decisions on the cases and issues they deal with. To this end, they have a more or less wide discretionary space, only partially explicit, which is modifiable but ineliminable (Evans & Harris, 2004). In fact, it constitutes the "instrument" of adaptation of the institutional mandate with respect to the variability and unpredictability of the situations and conditions in which it is implemented. The management of discretionary spaces constitutes the very essence of the SLBs' task, since they define priorities, assign benefits or sanctions, establish access or exclusion from services for potential users. These choices imply responsibilities that are not always and fully defined and protected by the legal framework and the institutional role they play. The result is a tendency to routinise decision-making processes, selecting achievable objectives and abandoning those deemed unfeasible or secondary, limiting the timing of interventions, and monitoring their results against supervisory mechanisms and control systems (Saruis, 2018). In this sense, school principals shape public school policies as they are actually used by stakeholders.

The complexity of this role also emerges with reference to the digital transformation of schools and to the concrete traits that policies for technologically competent schools assume. Digital tools and competences have entered in various ways at school and, even after the Covid-19 pandemic, their use has increased. However, research points to the persistence of various critical issues and challenges that need to be overcome in order to consider the digital transition, including at school, as complete. In this process, school leaders can play a crucial role provided they assume digital pedagogical leadership.

The profound transformation in the exercise of the teaching profession have contributed to redefining the role of teachers and principals: knowledge and disciplinary competences, teaching and learning methods, the relational system and learning contexts have seen numerous changes, demanding great flexibility and multidimensionality from teachers and principals. School leaders, also by virtue of the various school reforms, have progressively witnessed a change in the roles and tasks attributed to this profession, as well as in leadership models.

The transformative model, in which the school (and not the principal) is the center of educational change (Heck & Hallinger, 2014), has long been advocated as more effective (Berkovich, I. 2016), even if some authors argue that an organization will not learn as long as it continues to promote the dependency on a person (Bolívar, 2001). Another possible model is the learning-centred approach leadership which integrates instructional and transformational dimensions of leadership. It can be described as "all that set of activities carried out by the principals that have relationship with the improvement of the teachers & students' learning processes".

In the digital era, we can recognize the need of a digital leadership embodied by principals. The digital school leadership is defined as the educational leader's capacity of developing strategies to benefit from digital technology in order to improve in-person and virtual education. Indeed, innovation through digital technologies can only be achieved if it is guided by pedagogical objectives. In this sense, principals have to become digital pedagogical leaders. Being a digital pedagogical leader implies addressing the digital perspective and tools from pedagogical leadership approach in order to give the students better learning; moreover, looking for a shared vision of responsibility (not only to occupy a lead position) in which the whole educational staff has influence and a proactive role in its respective areas of work. The poor integration of digital technology in schools could be linked to low leadership (Ugur & Tugba, 2019) or insufficient digital pedagogical leadership.

1.2 Research aims

In order to explore the current and emerging training needs of primary school principals, the partnership of the ePRI4ALL project conducted ninety-nine in-depth semi-structured interviews with school leaders and experts in Spain, Greece, Italy and Poland. The topic explored by the interview's grid concerns the role of digital education in school, the training needs of school leaders and the main challenges that they have to face in order to be promoters of an inclusive and digitally competent school.

2 Methodology

In Italy, the Department of Education and Humanities of the University of Modena and Reggio Emilia conducted 25 semi-structured interviews: 6 interviews were conducted with experts, and 19 interviews were conducted with school principals.

All interviews except one, have been conducted remotely via G-Meet or Teams as school principals and experts were selected from North to South and Islands. The interviews lasted 1 hour on average and the interviews underwent a process of thematic analysis, starting from known literature and bottom-up approach.

Of the 19 interviewed principals 2 were males and 17 females. All of them have had years of experience as teachers, as this is a requirement to participate in the principal's selection process. Nine had taught in primary school, three in upper secondary school, four in lower secondary and three at different school levels.

Years of teaching experience before their current position vary between 10 and 32, with an average of 18 years. During their teaching years 17 principals had sometimes multiple, middle management responsibilities such as:

- Vice-principal (6)
- Teachers' coordinator (6)
- Special issues (inclusion, interculture) coordinator (5)
- Internal special issues commission member (2)
- School systemic evaluation (1)
- Worked in ministry decentralized office (2)

As for their current role, all of them lead public schools. 15 manage institutions that include primary and lower secondary schools, in some cases pre-schools; while 4 manage institutions that only include pre- and primary schools. 3 among them have adopted a special approach, called "Senza Zaino"[3].
The institutions are spread throughout the country:

- 6 in the north-west (4 in urban, 1 in rural and 1 in a mixed contest)
- 4 in the north-east (3 in urban and 1 in a mixed contest)
- 6 in the center (5 in urban, small towns and 1 in rural contest)
- 2 in the south and 1 in the island, all in marginalized and depressed inner-city areas.

---

[3] It is a network of schools where children do not carry backpacks (zaino in italian), but leave all their materials in school. The approach to teaching and learning is active, project-based, supports cooperation among students, and involves new technologies.

With respect to the social composition of the school, 5 principals declare that their school population belongs to the middle or upper middle class, 3 define it as lower middle class, 8 consider their school population as a mix of lower to upper middle class with some pour family, while 3 declare their school to be in a depressed, high-criminality rate, inner city area. All together 10 of these schools are in areas with a growing migrant population.

3 Results and Discussion

3.1 The experience of the school leaders with digital technologies

The emergency measures applied to contrast the spread of Covid-19 have forced school leaders to rethink their leadership role and the use of technologies. The analysis of the interviews highlight how this group of school leaders have repositioned themselves.

School leaders who were interviewed seem to have an instructional or learning-centered approach to leadership. In the interviews there is very little sign of pure transformative leadership. Principals who shared responsibilities and had supported the training of their staff in the use of ICT before the pandemic, report a much quicker and smoother transition to online learning. The learning-centered approach leadership, that softens the central role of principals with the involvement of teachers in the decision making process, has confirmed many in the idea that a principal should be able to recognize and enhance the talents limiting the amount of hierarchical decisions. *"If you build a model of this kind of school and management, I think it can only cascade to involve the rest of the context" (PI9).*

This leadership model also implies to *"have coordinating figures who can preside over the focal points of the school, capable of interfacing with the outside world as well" (PI11)*, because a principal alone cannot manage school complexity. Only one school principal seems closer to a transformative leadership, because she emphasizes team-shared decision making as a way to ensure flexibility and creativity in finding divergent solutions, adapted to school as a non-standard context.

Another sign of possible move toward transformational leadership is the necessity certain principals feel to open the school to the community, to help students see themselves as *"part of a community and a territory"* (PI8) to channel energies not only for individual gains, but for the community. One goes as far as considering training all staff as community animators, to leverage values and community leadership, to make the school the heart of community revival.

Another indicator of instructional leadership style is the type of communication tools used by most institutions. All principals declare to use and consider functional digital bulletin boards and logbooks, e-mails, sometimes the website for communication with both families and staff. Yet, foreign or low income families might have difficulties due to lack of devices or language barriers. Some of the more interactive digital channels such as platforms, web-radios, online question-time on specific issues, opened during the pandemic, have now been closed. Most school leaders use digital tools when it favors monodirectional (from the school to the parents) smoother communication. All the potential gains digital tools offer for bidirectional communication are not considered.

While many school leaders recognize that a close parental network supports fragile families and helps schools accomplish their mission, there are nosy and interfering parents that could be favoured by more relational communication channels. The solution, typical of the instructional leadership, is confirming the hierarchical structure of the relationship, with class representatives being the direct interface with teachers and school leaders.

The persistence of online meetings both for staff and families is an effective means to grant higher participation of all stakeholders getting things done because "*people online are more focused on the task*" (PI11), while limiting possible conflicts and the emergency of divergent opinions.

3.1.1 Digital pedagogical leadership

Digital tools have much potential for instruction: specific tools and projects (robotics, coding, drones, robots, video games, padlets and playful apps), the streamlining of daily work, project-based teaching approaches focused on 21st century skills, introduction of STEM teaching, platforms for teachers' collaborative

work and for documenting and making educational pathways available to colleagues are some of these potentialities. Also online sharing tools between pupils, with pupils and teachers and among teachers promotes a shift to participatory and interactive teaching. Most principals are aware of the need to support this pedagogical change while protecting the school community from the risks, in terms of privacy and data protection.

The interviewed school leaders feel the need to support teacher in exploring digital tools not only to compensate for specific learning needs (disabilities, L2), but also as interactive tools that support cooperative, inclusive and active learning and innovative digital assessment (flipped classroom, interdisciplinarity, reality tasks, feedback, self-assessment). This relates to the crucial role of digital leadership as promoter of digital projects aimed to enhance the learning environment integrating analog and digital approaches, to explore real-world and virtual-world interactions.

However, interviewed principals are still exploring their role as digital pedagogical leader. They mostly refer to specific projects to reflect on the use of digital tools such as the use and analysis of online communication tools to create advocacy skills and active citizenship, because they create opportunities for the use of digital tools in situations with a great connection to reality. Some principals consider specific training and documenting and sharing the projects with the entire school community during official meetings as key for the implementation of digital technologies in teaching.

Only few school leaders report the effectiveness of creating educational networks with other institutions to exchange training experiences, and the implementation of organizational settings that allows co-teaching during projects that use digital tools. These more learning-centered leadership approaches are not so widespread.

3.1.2   Using digital tools for inclusion

While principals agree with the need to include digital tools in everyday school activities, the feeling is that the investment in technology has not been accompanied by clear pedagogical goals and extensive training paths.

> *"One hoped that new technologies, then that was what they were called, could prove a tool to transform teaching methodologies, in reality this did not happen, because it remained a technical structure leaning on outdated teaching methodologies that did not lead to any revolution. It has somewhat disheartened the old teachers or those who felt inadequate to face this challenge but without pushing on a global rethinking of educational methods (...) A lot of money has been spent on teacher training, but the percentage of teachers who are aware of the power of technologies within educational pathways and who use them systematically to transform their teaching is really residual compared to the majority of teachers." (PI10)*

Thus, according to principals, schools face a double challenge. On the one hand there is a technical gap between digital experienced teachers, who often form in-house digital teams, average users and teachers with no expertise whatsoever. On the other hand, there is a general lack of reflection on the use of digital tools for triggering effective teaching and learning mechanisms and for inclusion.

According to many school leaders, the problem is that training tends to be focused on technical aspects, and not to open up spaces for dialogue on the meaning and limits of digital, and on educational spin-offs, partly because trainers often lack real knowledge of school realities. To create real change professional development on ICT should be held by experienced teachers trained thoroughly on digital tools. These experts could teach their colleagues the technical aspect, but also guide them in the possible pedagogical and methodological spillovers.

Some principals had the means and opportunities to create a competent internal digital team, able to train colleagues, at a growing level of complexity, through a cascade model (Kennedy, 2005). Internal training, structured as a workshop on issues specific to the institution, with a learning path co-designed by participating teachers, avoiding standardized proposals that do not take into account the context. This format helps grow in observational and sharing skills, and the creation of a community of practice, a powerful tool to support innovation. To promote lasting change in school training has to be articulated, prolonged, based on community of practice and tailored made: all these characteristics imply high costs.

Awareness of how to innovate teaching, making it more inclusive through digital, is not yet ingrained in all settings. Where this awareness exists, digital is used widely and across disciplines. Few principals are aware of the full potentials of digital for inclusion. Schools special need education teachers have been using digital tools as compensating devices for many years, and they lead the way for individual activities

with disadvantaged students. The use of individual devices does not consider the Universal Design for Learning approach, where digital tools are integrated in regular class activities, and focused on providing equal opportunities for all. It is an approach that enhances educational possibilities for all. This type of comprehensive approach is not widespread in Italian schools nor is supported by interviewed principals.

Digital tools can offer great opportunities for remote interaction among students and with educators, for example in the form of online rooms, where students can do homework and study separately or asking questions to peers or adults. These environments were open during the lockdown, but have now been closed. Yet, according to some principals, they could represent a great way to support fragile students' learning.

3.1.3 Training for school leaders

Most Italian principals train in preparation for the national competitive exam to enter the profession and during the probationary year. Each region offers professional development throughout the year on various topics, mainly legal, self-assessment and strategic priorities, management, and safety. *"Trainings that are essentially informational in nature, in a face-to-face mode" (PI10)*, yet, since this training is offered on a regional basis, type, topic, methodology can vary greatly.

The feeling of being insufficiently trained is especially present among principals who entered tenure in the last 10 years. Those with longer professional experience report longer and more structured initial professional development programs with much training on inclusion and interculturalism, less on digital issues, which had a different role at the time: *"today it is a pervasive tool that changes the learning and working environment, both of the secretary and teachers." (PI11)*

School leaders who are newer to the profession report that pedagogical-didactic aspects have been limited in their training. Without this training, they lack the ability to discern between different experiences, and the insight to define together with the educating community the identity of the school institution. They might consider administrative, managerial, organizational tasks as more important. They might not consider their pedagogical leadership role, unless they had pedagogical training courses during their career and thus have developed a greater sensitivity and

expertise on these issues. If they are school leaders in a different school level versus the one they thought in, they might not even be aware of the pedagogical and didactic need of the school they are managing.

Most principals report a lack of training in: inclusion, intercultural competencies, especially since there are no structured training paths after the probationary year. Principals, who believe that continuing education is important, independently attend master's degrees on the management of educational institutions, or on the use of technology, or on cross-cultural issues.

For most principals training should become an opportunity to meet other school leaders, share experiences, create a community of practice. Indeed, it is important to link the theoretical framework to practice, not only on a personal level, but finding a collective synthesis, building concrete applications together. From this point of view, building groups within institutions that train together, sharing experiences, field studies and practices, is very effective. Coherent with this idea is peer education in the form of job shadowing/visiting to be effective, to learn from comparison with different realities.

Since the digital are non-neutral tools that must be used, but must be approached with awareness, they require reflective training. Principals should be the first to do this reflection, perhaps during joint training paths together with teachers, because they have the task of presiding over and directing educational processes, guiding innovation and promoting a culture of change. These professional development courses should help them grasp the added value of digital, proposing new uses. *"Without these skills even what could be curved in this sense, such as digital, is experienced as a mere tool without knowing how to evaluate the consequences and possibilities" (PI7).*

4   Conclusion

Teaching for an inclusive, technologically competent and sustainable society is the key role of schools in the 21st Century and involves different stakeholders. School principals have been the target of Erasmus+ project ePRI4ALL, and the research emphasises training areas to be fostered to become digital pedagogical leaders. Many principals feel the need to strengthen their leadership and effective communication

skills, as these aspects are crucial to the promotion of all kinds of innovation, including digital-related innovation.

Managing their discretionary spaces, school principals can be a driver for inclusive uses of technologies in schools. However, they need to be trained in digital learning leadership, inclusive and creative digital learning, in taking advantage of digital possibilities for administrative management, for organizing work, for supporting operational functions, for designing, archiving and disseminating digital educational materials, and for maintaining relationships with other services active in the area. Another important role of school leaders is supporting the teaching staff's upskilling in digital education and the community involvement in the digital education process. The recent pandemic has triggered new investments and awareness, which together with the SDGs identify important goals for the school system. The risk, however, is that the investments are not accompanied by adequate pedagogical reflection with respect to the goals and ways of using digital tools, and that the skills developed are only medium-related and not content-related (Gui, 2019). In this process of change, teachers and school leaders remain a focal point of policy implementation, and can make a difference if adequately trained to face the new challenges. The ePRI4ALL project contributed to this goal producing open access educational resources.

References

Argentin, G. (2018). *Gli insegnanti nella scuola italiana.* Bologna, Il Mulino.
Berkovich, I. 2016. School leader and transformational leadership theory: time to part ways?. *Journal of Educational Administration*, 2016, 54 (5), 609-622.
Bertozzi, R., Saruis T. (2022). *Challenges for Early Childhood Professionals. An Empirical Research Project on the Strategies, Practices and Effects of LEADs.* In Colombo M. et al., Education and Emergency in Italy. How the Education System Reacted to the First Wave of Covid-19. BRILL, 5, 32-55.
Besozzi, E. (2017). Società, cultura e educazione, Milano, Carocci.
Bolívar, A. (2015). The comprehensive school in Spain: A review of its development cycle and crises. *European Educational Research Journal*, 14 (3-4), 347-363.
  https://doi.org/10.1177/1474904115592496
Croll, P., Abbott, D., Broadfoot, P., Osborn, M., Pollard, A. (1994). Teachers and education policy: Roles and models. *British Journal of Educational Studies*, 42 (4), 333-347.
Evans, T., Harris, J. (2004). Street-level Bureaucracy, Social Work and the (Exaggerated) Death of Discretion. *British Journal of Social Work*, 34 (6), 871-895.
Giunti, C., Ranieri, M. (2020). Professionalità Dirigente e innovazione scolastica. *Formazione & Insegnamento*, XVIII, 376-390.
Giunti, C., Ranieri, M. (2019). Modelli di autodirezione dell'apprendimento nella formazione dei Dirigenti scolastici: una rassegna sistematica della letteratura internazionale. *CQIA RIVISTA*, 9, 88-97, ISSN:2039-4039.

Giancola, O., Piromalli, L. (2020). Apprendimenti a distanza a più velocità, L'impatto del COVID-19 sul sistema educativo italiano. *Scuola Democratica*, 1-10.

Gui, M. (2019). *Il digitale a scuola*. Bologna, Il Mulino.

Heck, R. H., Hallinger, P. (2014). Modeling the longitudinal effects of school leadership on teaching and learning. *Journal of Educational Administration*, 52 (5), 653-681.

INDIRE (2020). *Indagine tra i docenti italiani pratiche didattiche durante il lockdown. Report preliminare 20 luglio 2020.* tinyurl.com/h64hh06c

Kennedy, A. (2005). Models of continuing professional development: A framework for analysis. *Journal of in-service education*, 31(2), 235-250.

JRC (2021). *What did we learn from schooling practices during the COVID-19 lockdown?*, European Union

Lipsky, M. (1980). *Street-level bureaucracy. Dilemmas of the individual in public services.* Russel Sage Foundation.

Ranieri, M. (2020). La scuola dopo la DAD. Riflessioni intorno alle sfide del digitale in educazione. *Studi sulla Formazione*, 23 (2), 69-76.

Saruis, T. (2018). Street-level workers' discretion in the changing welfare. *Cambio. Rivista sulle trasformazioni sociali*, 8 (16), 31-42.

SIRD (2020). *Per un confronto sulle modalità di didattica a distanza adottate nelle scuole italiane nel periodo di emergenza COVID-19.* https://www.sird.it/wp-content/uploads/2020/07/Una_prima_panoramica_dei_dati.pdf

Ugur, N.G., Tugba, K. (2019). Leading and teaching with technology: School principals perspective. *International Journal of Education Leadership and Management*, 7(1), 42.

Integrating Generative Language Models in Lesson Planning: A Case Study

Daša Berglez, Maja Kerneža
University of Maribor, Faculty of Education, Maribor, Slovenia
dasa.berglez@student.um.si, maja.kerneza1@um.si

The study explores artificial intelligence (AI) as a supportive technology in the lesson planning process of teachers, focusing on generative language models like ChatGPT. It evaluates the impact of AI on teaching strategies by comparing control and experimental groups of pre-service teachers interacting with the ChatGPT model. The aim was to create a lesson in metaphorical creativity and to understand the adaptability and effectiveness in lesson creation. Findings reveal no significant differences in pedagogical outcomes between groups, indicating that while AI offers innovative approaches, it doesn't fundamentally alter teaching effectiveness. The study It points out the potential and challenges of AI in education, advocating for further exploration to maximize its benefits and address ethical implications. This study contributes to the ongoing discourse on leveraging AI to enrich educational practices and emphasizes the critical role of educators in adapting AI tools for teaching.

VKLJUČEVANJE GENERATIVNIH JEZIKOVNIH MODELOV V NAČRTOVANJE POUKA: ŠTUDIJA PRIMERA

DAŠA BERGLEZ, MAJA KERNEŽA
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
dasa.berglez@student.um.si, maja.kerneza1@um.si

Študija proučuje uporabo umetne inteligence kot podporne tehnologije v procesu načrtovanja pouka s strani učiteljev, pri čemer se osredotoča na generativne jezikovne modele, kot je ChatGPT. Namen študije je oceniti vpliv umetne inteligence na učne strategije z analizo in s primerjavo med kontrolnimi in eksperimentalnimi skupinami bodočih učiteljev. Eksperimentalna skupina je za načrtovanje učne ure o metaforični ustvarjalnosti uporabila ChatGPT z namenom, da bi ocenili njegovo prilagodljivost in učinkovitost. Rezultati ne kažejo pomembnih razlik v izidih med skupinami, kar nakazuje, da umetna inteligenca, čeprav prinaša inovativne pristope, ne spreminja osnovne učinkovitosti poučevanja. Študija izpostavlja pomen izobraževanja in vključevanja učiteljev pri uporabi umetne inteligence v izobraževalnem procesu. Osvetljuje potenciale in izzive umetne inteligence v izobraževanju ter spodbuja nadaljnje raziskave za izkoriščanje njenih prednosti. Rezultati študije prispevajo k razpravi o uporabi umetne inteligence za izboljšanje izobraževalnih praks in poudarjajo ključno vlogo učiteljev pri prilagajanju orodij umetne inteligence.

Univerzitetna založba
Univerze v Mariboru

1   Introduction

Since late 2022, artificial intelligence (henceforth AI) has significantly impacted education, highlighted by the emergence of generative language model (henceforth GLM) ChatGPT (e.g. Baidoo-Anu & Owusu Ansah, 2023; Bonner et al., 2023; Kohnke et al., 2023). These developments, building upon earlier AI applications from basic computers to humanoid robots and interactive chatbots, have transformed both administrative and pedagogical practices, making education more personalized and interactive (Chen et al., 2020; Chen et al., 2021; Youfei et al., 2020). ChatGPT, known for its conversational abilities, has been particularly noted for its role in facilitating nuanced human-machine communication and demonstrating the potential of AI to support a diverse educational needs (OpenAI, 2022).

The integration of AI in education necessitates a comprehensive understanding of its role not just as a technological tool but as part of a broader societal construct influencing and reshaping educational methodologies (An & Oliver, 2021; Dron, 2022). Factors such as educators' background, institutional culture, and attitudes towards technology significantly influence the adoption and effectiveness of AI in teaching (Raygan & Moradkhani, 2022; Serin & Bozdag, 2020). This underscores the need for professional development tailored to educators' specific contexts to effectively utilize AI technologies (Kerneža and Zemljak, 2023a). Furthermore, the impact of AI on teaching and learning extends to influencing student success, with technology-assisted instruction showing positive effects on achievement, teaching efficacy, and engagement (Chaunan, 2016; Kareem, 2022). However, it's imperative to acknowledge the diversity among learners, as certain groups may derive more benefit from technology-supported education than others (Bergdahl et al., 2020). The decisions to incorporate chatbots in teaching, for example, is largely motivated by their perceived ease of use and usefulness, highlighting their potential to enhance educational practices (Choccarro et al., 2023).

Yet, for AI technologies to be effectively integrated into educational practices, educators must develop and refine a specific skill set. This includes the ability to identify and address technological challenges, think abstractly, and deeply understand and critically analyze the capabilities and outputs of AI tools like ChatGPT. Importance of such competencies, along with the broader implications of AI in education, including ethical, privacy, and reliability concerns, has been

emphasized in recent research (Kerneža, 2023; Vintar, 2023)- This underscores the critical role of ongoing teacher education and highlights the influence of teachers' self-assessed technology-related skills on the incorporation of contemporary technologies into educational activities (Chuan & Kabilan, 2021; Sailer et al., 2021).

Research indicates that AI, particularly through GLMs, significantly impacts educational outcomes across all levels, enhancing skills such as reading, writing, and critical thinking (Kasneci et al., 2023). These technologies support differentiate learning, accommodate diverse learner needs, and facilitate adaptive and inclusive educational environments (Jauhiainen & Guerra, 2023). However, the effective use of AI in education not only demands ongoing technological refinement but also a critical examination of its pedagogical integration to ensure it complements and enhances educational practices without compromising the quality of education or ethical standards.

Research Problem

While AI, particularly GLMs, holds transformative potential in education, it also introduces challenges and unanswered questions. This paper focuses on GLMs' role within the broad AI context in enhancing linguistic communication, a traditionally dominated by human interaction. Kunst Gnamuš (1984, p. 93) underscored communication's human-centric nature, driven by motivation and goals. ChatGPT's emergence as a tool of near-human communication, highlights the existing gap in AI's role in language skills development. Unlike human communication, the responses of the ChatGPT model are based on pre-existing data and lack the ability to adapt social needs and individual experiences as described by Kunst Gnamuš (1984). This highlights the need for specific research on the role of AI in developing communicative abilities, considering its limitations and potential in an evolving educational landscape.

Research Focus

This study explores the potential GLMs, like ChatGPT, to enhance communicative capabilities in education, focusing on metaphorical creativity among primary school students. Despite Lo (2023) highlighting the ChatGPT model's limitations in reliability and cross-subject effectiveness across, its contribution to teaching and

learning, particularly in linguistic and literary creativity, is substantial. This study delves in how AI facilitates the interplay of literal and figurative language, critical for developing children's metaphorical understanding as emphasized by Kunst Gnamuš (1984). Metaphors play a pivotal role in education, aiding in abstract concepts comprehension and reflecting the synthetic nature of human experience, pivotal for scientific innovation and diverse reality interpretations. The study underscores the necessity of fostering metaphorical expression in students to enhance their linguistic creativity through targeted exercises.

Research Aim and Research Questions

The primary aim of this study is to explore the utilization of AI, with specific emphasis on the GLM ChatGPT in the development of teaching strategies and the preparatory processes of the pre-service teachers. This research is centered on the realm of metaphorical creativity, seeking to examine the influence of GLMs on aspects such as pedagogical creativity and didactic coherence within the context of lesson planning. The research is guided by the following questions:

- How does the use of AI, specifically GLM ChatGPT, influence the pedagogical creativity in lesson plans developed by the pre-service teachers for metaphorical creativity?
- To what extent do lesson plans created by the pre-service teachers, with and without the assistance of AI, adhere to the theoretical foundations of metaphorical creativity? How do the pre-service teachers integrate AI into their lesson planning process, and what are the perceived limitations, considerations, and challenges of using AI, such as the ChatGPT model, in educational settings?

2   Research Methodology

General Background

This case study is based on a quasi-experimental design, fundamentally adopting both qualitative and quantitative approaches. It addresses identified gaps by exploring the impact of AI on the development of strategies and lesson preparations in the context of metaphorical creativity. This involves analyzing the interaction of

the pre-service teachers with the general language model ChatGPT and providing insights into the dynamics and challenges of integrating AI into educational processes.

Sample

The participants included in this study were 58 fourth-year pre-service teachers and the students from the Elementary Education program at one of Slovenian universities, specifically within the 'Didactics of Slovenian Language and Literature' course during the academic year of 2023/2024. As part of a study program, they are divided into four groups by their surnames. For the study, two of these groups were assigned as the control group and the other two as the experimental groups. These were further divided into 10 control (35 participants) and 8 experimental subgroups (23 participants) or lesson plan development. For analysis, these subgroups were treated as unified control and experimental group. All participant, having similar pedagogical backgrounds and AI exposure from the curriculum, were assumed to have a balanced distribution of prior teaching experience and AI familiarity. This grouping strategy, coupled with the exclusive use of ChatGPT 3.5 across the study, aimed to minimize confounding variables and attribute outcome differences directly to the use of AI in education.

Instruments and Procedures

In the Didactics of Slovenian Language and Literature course, pre-service teachers learn to develop primary school students' communicative competencies, including metaphorical creativity. They study theoretical foundations and practical approaches, culminating in creating lesson plans. The first part of the course was uniform for all, focusing on the theory and didactics of metaphorical creativity. In the second part, the participants were split into control and experimental groups. The control group created their lesson plans for metaphorical creativity independently, while the experimental group developed theirs with the assistance of AI, specifically the ChatGPT model. This interactive approach allowed the experimental group to explore and integrate innovative didactic methods and AI-supported technological solutions into their lesson plans. Detailed instructions regarding interactions with the GLM were not provided; instead, the decision was left to the participants' discretionary judgment, ensuring they could freely explore

and utilize ChatGPT in a manner that best suited their individual pedagogical goals and the specific requirements of their lesson plans. This autonomy in the use of ChatGPT was instrumental in fostering a creative and exploratory learning environment, where pre-service teachers could experiment with and reflect upon the integration of AI technologies into educational settings. This approach also mimics real-world scenarios where educators might use AI tools without predetermined guidelines, thus reflecting a more organic interactions between the pre-service teachers and the technology. The designed lesson plans were compared from two aspects, in addition to exploring the peculiarities that emerged in working with general language model ChatGPT. In the second part, where the experimental groups were instructed to develop their lesson plans with the assistance of ChatGPT, detailed documentation of interactions was maintained. This included specific prompts given to ChatGPT, the model's responses, and how these responses influenced the lesson planning process. Each interaction was meticulously recorded to capture the nuances of how AI could contribute to educational content development. However, it is important to note that due to the extensive nature, specificity, and complexity of these interactions between teachers and ChatGPT, they are not addressed in the present article. The intricacy of these engagement with ChatGPT necessitates a separate a separate, in-depth study to explore the pedagogical implications and the potential transformative impact of AI in lesson planning.

The first aspect focused on various elements of pedagogical effectiveness, for which only the extreme points of the Likert scales are shown, with 1 indicating the minimal and 5 the maximal level:

- *Pedagogical creativity* – the inclusion of fresh and innovative approaches to learning metaphors that could stimulate greater student engagement.
- *Didactic coherence* – logical arrangement of activities, progression from simple to more complex concepts.
- *Interactivity* – the level of interactivity and encouragement of student collaboration.
- *Technology* – the use of technology and other digital resources.
- *Adaptability* – adaptation to different learning styles and abilities of students, flexibility of activities for differentiation.

- *In-depth understanding* – enabling a deeper understanding of metaphors, not just recognition and use.
- *Reflection* – the design of concluding activities to reinforce knowledge and encourage reflection on the learning material.

The second aspect evaluated adherence to the theoretical foundations of metaphorical creativity, as defined by Olga Kunst Gnamuš (1984), comparing how the experimental and control groups applied these principles, with only the extreme points of the Likert scales shown, where 1 is minimal and 5 is maximal adherence:

- *Understanding of theoretical foundations* – the extent to which participants demonstrated an understanding of the theoretical concepts of metaphorical creativity.
- *Application of theoretical knowledge in practice* – the use of theoretical knowledge in designing lesson plans.
- *Integration of theory into the teaching process* – the integration of theoretical knowledge into the planning and execution of the lesson.

The third aspect of the study examined the complexities of using AI in education, focusing on integration, limitations, and ethical considerations, as well as its adaptability and future trends. Insights were gained from the interactions of the pre-service teachers with the ChatGPT model, using a qualitative approach to analyze how they incorporate Ai into lesson planning and address its challenges. The analysis utilized transcriptions of the conversations between participants and the ChatGPT model which were then systematically analyzed. The analysis of these interactions provided a deeper understanding of the role and potential of AI in educational settings.

Data Analysis

The data analysis aimed to understand, interpret, and connect the data, involving both qualitative and quantitative methods. Annotations were added, data were categorized and prepared for coding. Manual coding was conducted, utilizing open coding to identify fundamental themes and axial coding to connect these themes. The coding process was repeatedly reviewed and verified for consistency by two

independent researchers. IBM SPSS Statistics 27 was used for statistical analysis, including a Chi-Square test to test hypotheses regarding differences in pedagogical effectiveness and theoretical foundations among different student groups. The study also employed thematic analysis to explore AI nuances in education, considering methodological limitations and potential biases.

The qualitative analysis process commenced with the systematic examination of transcripts from the interactions between participants and ChatGPT. Initially, manual coding was applied using an open coding technique to discern primary themes. Subsequently, axial coding linked these themes to form a coherent understanding of the data. This iterative coding process was rigorously reviewed for consistency and reliability by two independent researchers, ensuring methodological rigor. The coding scheme was devised to categorize the types of pedagogical strategies derived from interactions with ChatGPT, focusing on creativity, adaptability, and technological integration. Categories were aligned with the research objectives to elucidate how ChatGPT could augment traditional lesson planning approaches.

This study was conducted adhering to the highest ethical standards, ensuring all participant interactions with ChatGPT were anonymized and used solely for the purpose of this research. Participants were informed about the research objectives and consented to their data being used for analysis. It was conducted in accordance with the research standards and ethics of Institute of Contemporary Technology, Faculty of Natural Science and Mathematics, University of Maribor (FNM_ICT) and approved by the Ethical commission for studies involving humans (1_2022).

3 Research Results

Pedagogical Effectiveness

The results of pedagogical effectiveness demonstrated by participants in the control and experimental groups are shown in Table 1.

Table 1: Comparison of Results Between the Control and Experimental groups based on Demonstrated Pedagogical Effectiveness

	Rating	Control Group		Experimental Group		Chi-Square Test
		f	f %	f	f %	
Pedagogical creativity	1	0	0.0	0	0.0	χ^2 (3) =2.292, p = .514
	2	1	10.0	1	12.5	
	3	5	50.0	2	25.0	
	4	3	30.0	2	25.0	
	5	1	10.0	3	37.5	
Didactic coherence	1	0	0.0	0	0.0	χ^2 (2) =3.420, p = .181
	2	0	0.0	0	0.0	
	3	3	30.0	2	25.0	
	4	7	70.0	3	37.5	
	5	0	0.0	3	37.5	
Interactivity	1	0	0.0	0	0.0	χ^2 (3) =2.340, p = .505
	2	0	0.0	1	12.5	
	3	4	40.0	2	25.0	
	4	4	40.0	2	25.0	
	5	2	20.0	3	37.5	
Technology	1	0	0.0	2	25.0	χ^2 (3) =2.292, p = .514
	2	6	60.0	3	37.5	
	3	3	30.0	3	37.5	
	4	0	0.0	0	0.0	
	5	1	10.0	0	0.0	
Adaptability	1	0	0.0	0	0.0	χ^2 (3) =4.621, p = .202
	2	0	0.0	1	12.5	
	3	5	50.0	3	37.5	
	4	5	50.0	2	25.0	
	5	0	0.0	2	25.0	
In-depth understanding	1	0	0.0	0	0.0	χ^2 (2) =2.957, p = .228
	2	0	0.0	0	0.0	
	3	4	40.0	3	37.5	
	4	6	60.0	3	37.5	
	5	0	0.0	2	25.0	
Reflection	1	0	0.0	0	0.0	χ^2 (3) =7.513, p = .057
	2	0	0.0	1	12.5	
	3	3	30.0	4	50.0	
	4	7	70.0	1	12.5	
	5	0	0.0	2	25.0	

The analysis of Table 1 reveals no statistically significant differences in pedagogical effectiveness between the experimental and control groupsm as indicated by Chi-Square tests across various pedagogical aspects. Notably, both groups showed similar levels of innovation in teaching metaphors, with no statistically significant advantage observed for either group χ^2 (3) =2.292, p = .514), although the experimental group tended to score higher. In examining didactic coherence, which

assesses the logical arrangement of activities, the experimental group displayed marginally better outcomes. However, these differences did not achieve statistical significance (χ^2 (2) =3.420, p = .181), suggesting that the use of ChatGPT does not markedly alter the structural coherence of lesson. Interactivity and encouragement of student collaboration also showed no statistically significant differences (χ^2 (3) =2.340, p = .505), despite a slight tendency for higher ratings within the experimental group. This trend continued with the use of technology and digital resources, adaptability to various learning styles, and the design of activities for in-depth understanding and reflection. In each case, while the experimental group occasionally showed higher scores, none of these differences reached statistical significance, indicating that integrating ChatGPT into lesson planning does not significantly impact these aspects of pedagogical effectiveness (Technology: χ^2 (3) =2.292, p = .514; Adaptability: χ^2 (3) =4.621, p = .202; In-depth Understanding: χ^2 (2) =2.957, p = .228; Reflection: (χ^2 (3) =7.513, p = .057). Despite the absence of statistically significant differences, the experimental group's tendencies towards higher ratings in several pedagogical aspects warrant attention. This observation suggests that while the immediate statistical impact of using ChatGPT on pedagogical effectiveness may not be evident, there is potential for AI to subtly influence educational practices. It highlights the need for further exploration into how AI, when thoughtfully integrated, might contribute to enhancing various dimensions of teaching and learning, even in the absence of stark statistical evidence.

Theoretical foundations of metaphorical creativity

The extent to which participants in the control and experimental groups adhered to the theoretical foundations of metaphorical creativity is shown in Table 2.

The analysis between the control and experimental groups shows that utilizing AI, specifically general language models like ChatGPT, in lesson planning did not significantly influence the participants' grasp and application of the theoretical concepts underpinning metaphorical creativity. The statistical analysis, conducted via the Chi-Square test, revealed no statistically significant differences between the groups' understanding or application of these concepts (Understanding: χ^2 (2) =2.831, p = .243; Application: χ^2 (2) =.070, p = .966; Integration: χ^2 (2) =2.831, p = .243). This suggests that both groups, irrespective of AI tool usage, exhibited

comparable proficiency in engaging with the core principles of metaphorical creativity.

Table 2: Comparison of Results Between Control and Experimental Groups Based On Adherence to the Theoretical Foundations of Metaphorical Creativity.

	Rating	Control Group		Experimental Group		Chi-Square Test
		f	f %	f	f %	
Understanding of theoretical foundations	1	0	0.0	0	0.0	$\chi^2 (2) = 2.831$, $p = .243$
	2	0	0.0	2	25.0	
	3	7	70.0	4	50.0	
	4	3	30.0	2	25.0	
	5	0	0.0	0	0.0	
Application of theoretical knowledge in practice	1	0	0.0	0	0.0	$\chi^2 (2) = .070$, $p = .966$
	2	1	10.0	1	12.5	
	3	6	60.0	5	62.5	
	4	3	30.0	2	25.0	
	5	0	0.0	0	0.0	
Integration of technology into the teaching process	1	0	0.0	0	0.0	$\chi^2 (2) = 2.831$, $p = .243$
	2	0	0.0	2	25.0	
	3	7	70.0	4	50.0	
	4	3	30.0	2	25.0	
	5	0	0.0	0	0.0	

This equivalence in performance indicates a pivotal insight: the integration of AI in this context does not markedly enhance or diminish educators' theoretical engagement with metaphorical creativity. It points to the current state of AI tools as adjunct aids that do not fundamentally alter the pedagogical process concerning theoretical understanding and its practical application. Such findings highlight the necessity for educators to perceive AI technologies as complementary resources that support, rather than supplant, traditional educational methodologies. Given this understanding, it becomes imperative for future research to probe deeper into how AI can be optimized to contribute meaningfully to the theoretical and practical aspects of education. This exploration should not only assess the technological capacities of AI but also explore innovative pedagogical strategies that leverage AI to foster enriched educational outcomes.

Nuances of Working with AI in the Process of Educational Planning

In the third aspect of the study, the nuances of working with AI, particularly the ChatGPT model, were explored through detailed analysis of the conversations between the pre-service teachers and the aforementioned GLM. The analysis

revealed critical engagement with this technology, highlighting both the potential and limitations of AI in educational settings. For instance, it was observed that the assumptions of the ChatGPT model about student ages and the appropriate grade level for metaphor lessons indicate a need for precise input to generate accurate content. The study also notes a tendency for the GLMs to extend the duration of the lessons and occasionally provide definitions or examples that were not entirely suitable for the intended age group. These observations underscore the importance of critical assessment and adaptation when integrating AI into lesson planning.

Furthermore, the discussions revealed a recurring theme of the GLM's lack of familiarity with specific educational systems and terminologies, necessitating further customization for local contexts. Occasional grammatical errors and the need for time constraints in lesson planning with AI were also highlighted. Despite these challenges, there were instances where the ChatGPT model provided innovative ideas and alternative activities, demonstrating its potential as a tool for enhancing creativity and adaptability in lesson planning. However, the reliance on AI for group work and discussion prompts was noted, along with its variable definitions of metaphors, indicating the need for educators to critically evaluate and possibly modify the AI-generated content.

A significant concern identified was the appropriateness of the metaphors suggested by the ChatGPT model. Some metaphors were identified as either directly translated from other languages or entirely fabricated, lacking cultural relevance or comprehensibility in the targeted language. This not only diminishes the educational value of the examples provided but also underlines the challenges of using AI for nuanced language tasks like metaphor teaching. Additionally, the complexity of definitions and examples provided by the ChatGPT model was often beyond the suitable level for the students, suggesting a gap in the GLM's ability to tailor content to varying cognitive and developmental stages.

Overall, the interactions with the ChatGPT model provided valuable insights into the dynamic nature of integrating AI in educational processes. While it offers innovative approaches and can support various aspects of lesson planning, its effective use requires awareness of its limitations and a critical approach to integrating its suggestions into teaching practice. This part of the study contributes to a broader understanding of how AI can be harnessed to enrich educational

strategies, while also stressing the critical role of educators in mediating and contextualizing AI-generated content. The need for careful selection and adaptation of AI-generated metaphors and definitions is particularly emphasized, ensuring that they are age-appropriate, culturally relevant, and pedagogically sound.

4   Discussion

The study of AI's integration, particularly via the ChatGPT model in educational settings, highlights a nuanced understanding the role of Ai in education. Despite the lack of significant differences in pedagogical effectiveness between AI-utilizing and non-utilizing groups, the study reveals AI's capacity to innovate pedagogical strategies without fundamentally altering core outcomes. The occasional higher creativity ratings in the experimental group, although not statistically significant, echo the importance of creativity in education as discussed by Oktradiksa et al. (2021) and Patston (2021). This aligns with Boden's (1998) view of creativity as inherent to human intelligence and challenges posed to AI, and Jennings' (2010) notion of 'creative autonomy' in AI systems.

Significantly, the findings contribute to the discourse on AI's practical application in education, suggesting that AI, like the ChatGPT model. Holds considerable potential for fostering innovative teaching strategies and personalized learning experiences, as seen in the non-significant yet educationally meaningful enhancements in pedagogical creativity. This potential underlines AI's role in offering novel perspectives and methods that traditional statistical methods may not fully capture, emphasizing the need for further exploration of AI's long-term educational impacts, including student learning outcomes and skill development (Vintar, 2023).

The study also underscores the indispensable role of educators in the AI integration process. Despite AI's adaptability in suggesting diverse activities, the effectiveness of these AI-generated suggestions heavily relies on educators' ability to integrate them into the curriculum thoughtfully. This highlights a critical need for precise and context-specific input to AI systems to ensure the relevance and appropriateness of AI-generated content, addressing potential misinterpretations or generalizations by AI regarding student ages and lesson suitability. Addressing AI's limitations in understanding specific educational contexts necessitates scalable frameworks and

collaborative efforts to enhance AI tools' adaptability, such as advanced contextual adaptation algorithms and platforms for educator-AI developer collaboration. These efforts are pivotal for leveraging AI's educational vale effectively and aligning its deployment with pedagogical objectives. Ethical considerations, including biases and privacy concerns associated with AI use in education, demand a thoughtful approach to ensure ethical AI integration, balancing technological advances with pedagogical ethics and social responsibility. The need for further research is evident, with future studies advised to broaden demographic and contextual variable analyses and explore AI's long-term effects on education.

In a future deeply intertwined with AI (Kordigel Aberšek & Aberšek, 2020), the imperative role of AI in reshaping education is undeniable (Grassini, 2023). This study delves into AI's current and potential impact in education, highlighting ChatGPT's capabilities. It reaffirms the educator's indispensable role in leveraging AI to enrich pedagogical practices and emphasizes the necessity for ongoing adaptation and development of teaching strategies that incorporate AI technologies effectively. AI's integration in education suggests a paradigm shift where teaching strategies, student outcomes, and critical thinking development are concerned. Educators are pivotal in this transformation, guiding the seamless incorporation of AI into the curriculum to augment traditional teaching methods. This requires a profound understanding of AI's functionalities and limitations, ensuring Ai's contributions are both meaningful and ethically sound. The dynamic between AI tools like ChatGPT and educational content creation showcases the potential for customized learning experiences, addressing the diverse needs of students and promoting deeper engagement and understanding.

Grounded in a case study approach, this study's quasi-experimental design with 58 participants exposes limitations in statistical power and generalizability, especially in identifying minor effects of AI integration in educational settings. The focus on ChatGPT, while insightful, restricts the examination to a narrow slice of the AI spectrum, thus curtailing the findings' wider applicability. The research context and potential biases, such as selection and confirmation biases, further condition the applicability of our results beyond the specific sample explored. These factors underline the necessity for expansive and diverse future research to comprehensively grasp the potentials and hurdles of AI in education, advocating for a broader exploration of AI tools and a commitment to methodological rigor.

The IMPACT model Kerneža and Zemljak (2023b) exemplifies a structured approach to adopting AI in teaching, highlighting the importance of strategic planning in AI integration to achieve pedagogical objectives. As AI evolves, it presents an expansive opportunity to enhance educational practices, contingent upon its judicious and critical application aligned with educational ethics and goals. Flogie and Aberšek (2021, p. 97) caution against uncritical adoption of AI, advocating for a balanced approach that considers ethical implications and the value AI brings to the educational process. Furthermore, it is critical to recognize not every AI application is inherently beneficial or ethically acceptable. The discernment of AI's utility and ethical deployment in education should engage a broad spectrum of expertise beyond the technological domain, incorporating insights from behavioral sciences to ensure AI's impact is both positive and equitable.

This discussion reiterates the significance of AI in modern education, advocating or a thoughtful approach that leverages AI's strengths while addressing its challenges. It calls for an educator-driven integration process, underpinned by frameworks like the IMPACT model, to navigate the complexities of AI in education. The future of education with AI is not only about embracing new technologies but also about fostering an inclusive, innovative, and ethically responsible learning environment.

5   Conclusions

The exploration of AI, particularly GLMs like ChatGPT, is crucial in reshaping education. The main conclusion of this study emphasizes the necessity of balanced integration of technology in education. It emphasizes that the true value of AI lies not in replacing the educator but in augmenting the educational experience with innovative strategies and resources.

This research provides a comprehensive analysis of the nuanced role of AI in education, offering insights into its potential limitations. It concludes that the integration of AI into educational planning is a complex, multifaceted process that requires careful consideration, critical assessment, and strategic implementation. The findings of this study contribute to a more complete understanding of how AI can be effectively harnessed to enrich educational strategies, ensuring that it serves as a tool that aligns with and enhances pedagogical goals.

As we stand at this milestone of the future of education, marked by the rapid advancement of AI, it is important that educators, policymakers, researchers and others recognize both the immense potential and the inherent challenges of integrating AI into the educational setting. The journey of integrating AI into education is ongoing, and this study provides one step towards understanding its trajectory. It is a call to action for continued exploration, critical evaluation, and thoughtful implementation of AI in educational settings. The future of education is not predetermined. It is shaped by our collective efforts to understand, adapt, and innovate. As we all continue to navigate the evolving landscape of AI in education, this study serves as a foundation, emphasizing the need for a nuanced approach to integrating technology in pedagogical practices. The path forward is one of collaboration, innovation, and ongoing inquiry to ensure that the integration of AI not only meets educational standards but also enriches the learning experience for all.

Acknowledgments

References

An, T., & Oliver, M. (2021). What in the world is educational technology? Rethinking the field from the perspective of the philosophy of technology. *Learning, Media and Technology, 46*(1), 6–19. https://doi.org/10.1080/17439884.2020.1810066

Baioo-Anu, D., & Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Journal of AI, 7*(1), 52–62. https://doi.org/10.61969/jai.1337500

Bergdahl, N., Nouri, J., Fors, U., & Knutsson, O. (2020). Engagement, disengagement and performance when learning with technologies in upper secondary school. *Computer & Education, 149*, 103783. https://doi.org/10.1016/j.compedu.2019.103783

Boden, M. A. (1998). Creativity and artificial intelligence. *Artificial intelligence, 103*, 347–356.

Bonner, E., Lege, R., & Frazier, E. (2023). Large language mode-based artificial intelligence in the language classroom: Practical ideas for teaching. *Teaching English with Technology, 23*(1), 23–41. http://dx.doi.org/10.56297/BKAM1691/WIEO1749

Chang, C. H., & Kidman, G. (2023). The rise of generative artificial intelligence (AI) language models – challenges and opportunities for geographical and environmental education. *International Research in Geographical and Environmental Education, 32*(2), 85–89. https://doi.org/10.1080/10382046.2023.2194036

Chauhan, S. (2016). A meta-analysis oft he impact of technology on learning effectiveness of elementary students. Computers & Education, 105, 14–30. https://doi.org/10.1016/j.compedu.2016.11.005

Chen, L., Chen, P., and Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access, 8*, 75264–75278. https://doi.org/10.1109/access.2020.2988510

Chen, X., Zou, D., Xie, H., Cheng, G., & Liu, C. (2022). Two decades of artificial intelligence in education: Contributors, collaborations, research topics, challenges, and future directions. *Educational technology and Society, 25*(1), 28–47. https://www.jstor.org/stable/48647028

Chocaro, R., Cortinas, M., & Marcos-Matas, G. (2023). Teachers' attitudes towards chatbots in education: A technology acceptance model approach considering the effect of social language, bot proactiveness, and users' characteristics. *Educational Studies, 49*(2), 295–313. https://doi.org/10.1080/03055698.2020.1850426

Chuah, K. M., & Kabilan, M. K. (2021). Teachers' views on the use of chatbots to support English language teaching in a mobile environment. International *Journal of Emerging Technologies in Learning, 16*(20), 223–237. http://dx.doi.org/10.3991/ijet.v16i20.24917

Dron, J. (2022). Educational technology: What it is and how it works. *AI & Society, 37*. 155–166. https://doi.org/10.1007/s00146-021-01195-z

Flogie, A., & Aberšek, B. (2021). Artificial intelligence in education. In O. Lutsenko, & G. Lutsenko (Eds.), *Active Learning. Theory and Practice* (pp. 97–118). IntechOpen. http://dx.doi.org/10.5772/intechopen.96498

Grassini, S. (2023). Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Sciences, 13*(7), 692. https://doi.org/10.3390/educsci13070692

Jauhiainen, J. S., & Guerra, A. G. (2023). Generative AI and ChatGPT in school children's education: Evidence from a school lesson. *Sustainability, 15*(18), 14025. https://doi.org/10.3390/su151814025

Jennings, K. E. (2010). Developing creativity: Artificial barriers in artificial intelligence. *Minds and Machines, 20*, 489–501. https://doi.org/10.1007/s11023-010-9206-y

Kareem, J., Thomas, R. S., & Nandini, V. S. (2022). A conceptual model of teaching efficacy and beliefs, teaching outcome expectancy, student technology use, student engagement, and 21st-century learning attitudes: A STEM education study. Interdisciplinary Journal of Environmental and Science Education, 18(4), e2282. https://doi.org/10.21601/ijese/12025

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gassser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., …, Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103,* 102274. https://doi.org/10.1016/j.lindif.2023.102274

Kerneža, M. (2023). Fundamental and basic cognitive skills required for teachers to effectively use Chatbots in education. In V. Lamanauskas(Ed.), *Science and technology education: New developments and Innovations. Proceedings of the 5th International Baltic Symposium on Science and Technology Education (BalticSTE2023)* (pp. 99-110). Scientia Socialis Press. https://doi.org/10.33225/BalticSTE/2023.99

Kerneža, M., & Zemljak, D. (2023a). Science teachers' approach to contemporary assessment with a reading literacy emphasis. *Journal of Baltic Science Education, 22*(5), 851–864. http://dx.doi.org/10.33225/jbse/23.22.851

Kerneža, M., & Zemljak, D. (2023b). IMPACT model: A comprehensive framework for planning the use of chatbots in didactic unit. In L. Gómez Chova, A. López Martínez, J. Lees (Eds.), *ICERI2023 Proceedings. 16th International Conference on Education, Research and Innovation, November 13th–15th, 2023, Seville, Spain*, pp. 1522–1527. IATED Academy. https://doi.org/10.21125/iceri.2023.0477

Kohnke, L., Moorhouse, B. M., & Zou, D. (2023). ChatGPT for language teaching and learning. *RELC Journal, 54*(2), 537–550. https://doi.org/10.1177/00336882231162868

Kordigel Aberšek, M., & Aberšek, B. (2020). *Society 5.0 and Literacy 4.0 for the 21st century*. Nova Science Publishers. https://doi.org/10.52305/ZJBJ8012

Kunst-Gnamuš, O. (1984). *Govorno dejanje – družbeno dejanje: komunikacijski model jezikovne vzgoje [Speech act – social act: A communicative model of language education]*. Pedagoški inštitut.

Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences, 13*(4): 410. https://doi.org/10.3390/educsci13040410

Oktradiksa, A., Bhakti, C. P., Kurniawan, S. J., Rahman, F. A., & Ani. (2021). Utilization artificial intelligence to improve creativity skills in society 5.0. *Journal of Physics: Conference Series, 1760*(1), 012032.https://doi.org/10.1088/1742-6596/1760/1/012032

OpenAI. (2022, November 30). *Introducing ChatGPT*. https://openai.com/blog/chatgpt

Patston, T. J., Kaufman, J. C., Cropley, A. J., & Marrone, R. (2021). What is creativity in education? A qualitative study of international curricula. *Journal of Advanced Academics, 32*(2), 207–230. https://doi.org/10.1177/1932202X20978356

Raygan, A., & Moradkhani, S. (2022). Factors influencing technology integration in an EFL context: Investigating EFL teachers' attitudes, TPACK level, and educational climate. *Computer Assisted Language Learning, 35*(8), 1789–1810. https://doi.org/10.1080/09588221.2020.1839106

Sailer, M., Stadler, M., Schultz-Pernice, F., Franke, U., Schoffmann, C., Paniotova, V., Husagic, L., & Fischer, F. (2021). Technology-related teaching skills and attitudes: Validation of a scenario-based self-assessment instrument for teachers. *Computers in Human Behavior, 115*(2), 106625. http://dx.doi.org/10.1016/j.chb.2020.106625

Serin, H., Bozdag, F. (2020). Relationship between teachers' attitudes towards technology use in education and autonomy behaviors. Turkish Online Journal of Educational Technology, 19(3), 60–69.

Vintar, Š. (2023). Jezik in umetna inteligenca: kam nas vodijo veliki jezikovni modeli [Language and artificial intelligence: Where big language models are taking us]. In J. Vogel (Ed.), *59. seminar slovenskega jezika, literature in kulture: Slovenski jezik, literatura, kultura in digitalni svet(ovi)*, pp. 21–28. https://centerslo.si/wp-content/uploads/2023/06/59.-SSJLK_Zbornik.pdf#page=21

Yufei, L., Saleh, S., Jahui, H., & Syed Abdullah, S. M. (2020). Review of the application of artificial intelligence in education. *International Journal of Innovation, Creativity and Change, 12*(8), 548–562.

Bridging the Gap: Understanding Teacher Perspectives on Humanoid Robots in Education

Dejan Zemljak,[1] Maja Kerneža[2]

[1] University of Maribor, Faculty of Natural Sciences and Mathematics, Maribor, Slovenia
dejan.zemljak1@um.si
[2] University of Maribor, Faculty of Education, Maribor, Slovenia
maja.kerneza1@um.si

This study explores the readiness of 233 teachers, comprising 124 in-service teachers from diverse Slovenian schools and 109 pre-service teachers from two faculties, to integrate humanoid robots – defined as robots with human-like features and capabilities – into educational settings. By evaluating attitudes, along with perceived benefits such as challenges including technological accessibility and ethical concerns, the study assesses readiness across teaching status (in-service vs- pre-service) and levels (primary vs. secondary). Utilizing Mann-Whitney U test and two-way ANOVA, findings reveal moderate readiness without significant differences between groups, but a wide range of individual attitudes. The results suggest the necessity of further research to explore the link between perceived readiness and effective integration strategies, including the development of ethical guidelines and support mechanisms for teachers. This contribution highlights the importance of a collaborative approach to integrate humanoid robots responsibly and effectively into educational environments.

Premagovanje vrzeli: razumevanje stališč učiteljev o humanoidnih robotih v izobraževanju

Dejan Zemljak,[1] Maja Kerneža[2]

[1] Univerza v Mariboru, Fakulteta za naravoslovje in matematiko, Maribor, Slovenia
dejan.zemljak1@um.si
[2] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenia
maja.kerneza1@um.si

Študija raziskuje pripravljenost 233 učiteljev, 124 zaposlenih učiteljev iz različnih slovenskih šol in 109 študentov pedagoških študijskih smeri iz dveh slovenskih fakultet, za integracijo humanoidnih robotov – roboti s človeku podobnimi lastnostmi in sposobnostmi – v izobraževalna okolja. Z ocenjevanjem stališč študija ocenjuje pripravljenost glede na status poučevanja (zaposleni učitelji oz. študenti pedagoških smeri) ter stopnjo poučevanja (razredna oz. predmetna stopnja). Z uporabo Mann-Whitneyjevega U-testa in dvosmerne ANOVE so ugotovitve pokazale zmerno pripravljenost brez bistvenih razlik med skupinami, vendar s širokim razponom individualnih stališč. Rezultati kažejo na potrebo po nadaljnjih raziskavah, ki bi raziskale povezavo med zaznano pripravljenostjo in učinkovitimi strategijami vključevanja, vključno z razvojem etičnih smernic in podpornih mehanizmov za učitelje. Ta prispevek poudarja pomen skupnega pristopa za odgovorno in učinkovito vključevanje humanoidnih robotov v izobraževalna okolja.

1 Introduction

In the dynamic field of educational technology, humanoid robots – robots designed to mimic human appearance and behavior – represent a significant leap forward from traditional learning tools. Defined as programmable entities that resemble and act like humans (Graefe & Bischoff, 2003; Ting et al., 2014), these robots transition from science fiction to classroom facilitators, offering novel, interactive learning experiences (Dautenhahn, 2007; Engwall & Lopes, 2022). Unlike other educational technologies, humanoid robots provide a unique combination of interaction, embodiment, and adaptability, positioning them at the forefront of pedagogical innovation.

Empirical research underscores the specific advantages of integrating humanoid robots into education (e.g., Belapme et al., 2018; Movellan et al., 2009). Studies have demonstrated their ability to not only enhance learning outcomes, such as reading skills and interactive discussions as evidenced by tools like the NAO robot (Breßler & Mohnke, 2023), but also advance language learning (Kanda et al., 2004) and reduce stress (Buchem & Thomas, 2022). Beyond these benefits, research indicates that humanoid robots can significantly pique interest in learning among elementary school students, offering promising prospects for robot-assisted education (Chin et al., 2011). As teaching assistants, these robots excel by being programmable, agile, stable and lifelike (Tuna et al., 2019), qualities that enable them to support computational thinking, logical skills, and effective classroom management (Gouraguine et al., 2022; Ospennikova et al., 2015). These robots augment teaching, offering assistance and enrichment beyond traditional methods by acting as tutors, playmates, and entertainers (Christodoulou et al., 2020; Pande & Mishra, 2023; Wang, Sang & Huand, 2023), thereby improving student understanding, engagement, and nonverbal communication (Kennedy et al., 2015).

However, the adoption of humanoid robots in education is not without its challenges. Ethical considerations surrounding privacy, potential attachment, and the risk of reduced human interaction highlight the need for a careful and balanced approach (Rani et al., 2022; Rsang, 2020; Sharkey, 2016). The humanoid appearance and anthropomorphic characteristics of these robots necessitate thoughtful considerations in their application, tailored to the research domain and age group participants (Sharkey, 2016; Tuna et al., 2019).

Research Problem

Educator attitudes are critical components of the educational process, influencing not only the acceptance and integration of new technologies such as humanoid robots, but also the overall learning environment and student outcomes. Understanding these attitudes, their formation, and their impact is crucial for effective integration of innovations into educational settings. The views of teachers, who act as the main agents in the educational system, are shaped by the intricate interaction of affective, cognitive, and behavioral factors (Maio & Haddock, 2010). These attitudes are significant, as educators shape the learning process (Darling-Hammond, 2000) and the educational milieu to a substantial degree (Ballantine & Spade, 2006). Given that the attitudes of educators significantly co-shape their agreement on or opposition to curricular changes (Alkhateeb, 2018), the awareness and understanding of these attitudes is crucial. Influencing the attitudes of educators through targeted and quality education in specific areas, such as the integration of humanoid robots into educational settings, can lead to more informed and supportive stances towards these technological advancements.

Research Focus

Most studies show that educators have a mostly positive attitude towards the integration of modern technologies in the classroom (e.g. Akram et al., 2022; Chocarro et al., 2023; Sailer, 2021). However, the integration of humanoid robots in education could represents a significant pedagogical shift, necessitating the support and acceptance of educators. It is essential to understand their perspective on this integration to gauge its future in teaching and learning. Studies reveal varied insights into teacher readiness, concerns, and perceived pros and cons of using humanoid robots, shaping a holistic view of their impact and the evolution of educational practices. Demirbilek (2022) found that most K-12 teachers have not used humanoid robots but are open to it, mainly as a supportive tool. Reich-Stiebert and Eyssel (2016) observe that despite the enthusiasm of students, teachers prefer robots in limited roles, due to their unfamiliarity and integration challenges. Alcorn et al. (2019) noted that, while educators see benefits in using robots for students with autism, they are wary of potential over-reliance on them. Istenič et al. (2021) identified a disconnect between the efforts of researchers in making robots more human-like and the level of acceptance by pre-service teachers, highlighting the need

for teacher education on robot integration. Zemljak and Kerneža (2023) surveyed 211 Slovenian teachers, who hesitate on or even reject the use of humanoid robots in their classroom, especially if the robots were also showing emotion (Kerneža et al., 2023). To overcome these concerns, Zemljak and Kerneža (2023) recommend a comprehensive approach for robot integration, ongoing assessment, strategic planning, practical implementation, and continual evaluation to enhance both teaching and learning experiences with these emerging technologies.

Research Aim and Research Questions

The primary aim of this research is to systematically explore and understand the attitudes of in-service and pre-service teachers toward integrating humanoid robots into education. The study aims to identify key factors influencing the readiness of educators to adopt such technologies and to examine the implications of these attitudes on the teaching and learning process. The survey explores:

- What is the overall readiness of teachers for the use of humanoid robots in education?
- What is the readiness of teachers for the use of humanoid robots in education, based on their teacher status?
- What is the readiness of teachers for the use of humanoid robots in education, based on their teaching level?
- What is the readiness of teachers for the use of humanoid robots in education, based on their teacher status and their teaching level?

2 Research Methodology

General Background

This research addresses the readiness of both in-service and pre-service teachers to integrate humanoid robots into education. It explores the gap between understanding and acceptance, crucial for successful implementation of these technologies. The study investigates the willingness, interest, perceived potential, and awareness of educators, and compares attitudes between pre-service and in-service teachers. The goal is to gain a detailed understanding of these issues to inform

strategies for overcoming challenges and leveraging opportunities in integrating humanoid robots into educational settings. For this purpose, a descriptive non-experimental study was conducted.

Sample

In this study, 124 in-service teachers, regularly employed as teachers at primary or secondary level, were surveyed using simple random sampling, including 38 primary and 86 secondary school teachers. Their experience ranged from 0 to over 35 years, distributed as follows: 9 teachers with 0-5 years, 31 with 6-15 years, 48 with 16-25 years, 20 with 26-35 years, and 16 with over 35 years of experience. For pre-service teachers, 109 participants, students from two Slovenian faculties, one in science education and one in social science education field of study, were surveyed through convenience non-random sampling, comprising 80 primary and 29 secondary school teacher candidates. The study uses "teacher status"" to refer collectively to pre-service and in-service teachers, and "teaching level" to denote whether they are involved in primary or secondary education.

Instruments and Procedures

In September 2022, a pilot study with 14 in-service teachers (7 primary, 7 secondary school) and 7 pre-service teachers was conducted to develop the final survey questionnaire. Feedback from participants and validation by two independent educational research experts helped refine the questionnaire. The main study was carried out with in-service teachers in autumn 2022 and pre-service teachers in spring of 2023, using the online survey platform "1ka". Participants were greeted with welcoming message that introduced study, outlining its objectives and significance, a description of humanoid robots was given. They were told that humanoid robots are robots that resemble humans in shape (Yoshida, 2019), but in addition to appearance, they also mimic human behavior and successfully replicate functions such as sensing, decision-making and interaction (Yang, 2019). It also emphasized the ethical considerations integral to the research. It was ensured that all participants were fully informed about the nature of the study, the voluntary basis and their right to withdraw at any time without any consequences. The survey targeted primary and secondary school teachers (pre-service and in-service). Participants rated their readiness to integrate robots into teaching on a 5-point Likert

scale (1 – strongly disagree; 2 – disagree; 3 – neutral; 4 – agree; 5 – strongly agree), covering their eagerness to use robots (I wish to use robots in teaching as soon as possible), interest in their application (I am interested in the field of application and integration of robots into teaching), perceived potential in teaching generally (I see significant potential in using robots in teaching in general) as well as in specific subjects (I see significant potential in using robots in my specific subject area), and awareness of progress in this field (I follow progress in this field). They also provided information on their teacher status (pre-service or in-service teacher) and their teaching level (primary or secondary school).

The questionnaire's reliability was verified calculating item-total and inter-item correlations. To determine how well each item correlates with the total score of all other items in the questionnaire, item-total correlations were calculated. All observed items show at least modest reliability, most excellent reliability. In line with established psychometric standards, suggesting that the questionnaire is both valid and effective for measuring the intended construct (Table 1).

Table 1: Item-Total Correlations for the Questionnaire

	I wish to use robots in teaching as soon as possible.	I am interested in the field of application and integration of robots into teaching.	I see significant potential in using robots in teaching in general.	I see significant potential in using robots in my specific subject area.	I follow progress in this field.
I wish to use robots in teaching as soon as possible.	1	.753	.809	.797	.477
I am interested in the field of application and integration of robots into teaching.	.753	1	.837	.820	.458

	I wish to use robots in teaching as soon as possible.	I am interested in the field of application and integration of robots into teaching.	I see significant potential in using robots in teaching in general.	I see significant potential in using robots in my specific subject area.	I follow progress in this field.
I see significant potential in using robots in teaching in general.	.809	.837	1	.905	.452
I see significant potential in using robots in my specific subject area.	.797	.820	.905	1	.489
I follow progress in this field.	.477	.458	.452	.498	1

To assess the consistency among all items, indicating whether they are measuring similar aspects of the construct, inter-item correlations were checked (Table 2).

Table 2: Inter-Item Correlations for the Questionnaire

	I wish to use robots in teaching as soon as possible.	I am interested in the field of application and integration of robots into teaching.	I see significant potential in using robots in teaching in general.	I see significant potential in using robots in my specific subject area.	I follow progress in this field.
I wish to use robots in teaching as soon as possible.	1.000	.753**	.809**	.797**	.477**

	I wish to use robots in teaching as soon as possible.	I am interested in the field of application and integration of robots into teaching.	I see significant potential in using robots in teaching in general.	I see significant potential in using robots in my specific subject area.	I follow progress in this field.
I am interested in the field of application and integration of robots into teaching.	.753**	1.000	.837**	.820**	.458**
I see significant potential in using robots in teaching in general.	.809**	.837**	1.000	.905**	.452**
I see significant potential in using robots in my specific subject area.	.797**	.820**	.905**	1.000	.498**
I follow progress in this field.	.477**	.458**	.452**	.498**	1.000

Note. **Correlation is significant at the .01 level.

Overall, the Table 2 shows a coherent pattern of strong positive correlations among most attitudes, suggesting that these items effectively capture related aspects of the educators' perceptions and readiness to use humanoid robots in education. The moderate correlations suggest that while important, it might be influenced by other factors, and are suitable for analysis.

Ethical Procedures

The study was conducted in accordance with the research standards and ethics of Institute of Contemporary Technology, Faculty of Natural Science and Mathematics, University of Maribor (FNM_ICT) and approved by the Ethical commission for studies involving humans (1_2022).

Data Analysis

Data were analyzed using the IBM SPSS 27 software. Basic statistics provided insights into sample characteristics. The readiness of teachers, differentiated by their status (pre-service or in-service) and teaching level (primary or secondary school), was compared across five statements using the Mann-Whitney U test for non-parametric comparison. Additionally, a two-way ANOVA test was conducted to explore the interactive effects of the teaching level and teacher status on their readiness to use humanoid robots in education. Where the results are statistically significant, the effect size (r) is also calculated in the interpretation of the results.

3   Research Results

3.1   Overall Readiness of Teachers for the Use of Humanoid Robots in Education

Table 3 shows the overall readiness of pre-service and in-service teachers to use humanoid robots in education, based on five different statements.

Table 3: Overall Readiness of Teachers to use Humanoid Robots in Education

	N	M	SD
I wish to use robots in teaching as soon as possible.	233	2.48	1.103
I am interested in the field of application and integration of robots into teaching.	233	3.09	1.252
I see significant potential in using robots in teaching in general.	233	2.79	1.155
I see significant potential in using robots in my specific subject area.	233	2.73	1.166
I follow progress in this field.	233	2.46	1.141

The mean scores from Table 3 provide insights into the overall readiness and attitudes of the teachers towards humanoid robots in education. The desire to begin using robots soon (M = 2.48) is below the neutral midpoint, indicating reluctance in adopting robots in teaching. However, there is a moderate interest in exploring robot application and integration (M = 3.09), showing a positive, yet varied (SD = 1.252) inclination towards robotic applications in education. Responses spanned from the minimum (1) to maximum (5) values on the Likert scale, reflecting a wide spectrum of opinions. The perceived potential of robots in general teaching (M = 2.79) is marginally above neutral, suggesting some recognition of their benefits in education; however, not overwhelmingly so. This is mirrored in the slightly above-neutral response for the potential of robots in specific subjects (M = 2.73), indicating cautious optimism, accompanied by varied perceptions of their relevance across different disciplines. Lastly, the score for following progress in the field (M = 2.46) is near neutral, leaning towards a lack of active engagement in current developments in educational robotics. This aligns with the overall moderate readiness for and interest in adopting robotic technology, highlighting a need for more awareness and engagement in advancements in this area to encourage a more informed and enthusiastic adoption among educators.

3.2 The Readiness of Teachers for the Use of Humanoid Robots in Education Based on Their Teacher Status

Table 4 compares the readiness of pre-service and in-service teachers to adopt humanoid robots in education, based on five statements.

As shown by the results in Table 4, the analysis shows that both pre-service and in-service teachers exhibit a comparable level of readiness to integrate humanoid robots into their teaching practices. The mean rank for in-service teachers is slightly higher when compared to that of pre-service teachers ($M_{pre-service}$ = 113.03, $M_{in-service}$ = 120.48) in their eagerness to adopt robots soon, but this difference is not statistically significant (U = 6325.5, z = -0.87, p = .383). Similarly, both groups demonstrate comparable interest levels in learning about the application and integration of robots ($M_{pre-service}$ = 118.19, $M_{in-service}$ = 115.96; U = 6628.5, z = -0.26, p = .794). In terms of the perceived general potential of humanoid robots in education, the mean ranks are very similar ($M_{pre.-service}$ = 118.19, $M_{in-service}$ = 115.95; (U = 6628.0, z = -0.263, p = .793), indicating no significant difference in their outlook. The readiness regarding

the potential of robots in specific subject areas also shows a marginal difference ($M_{pre-service}$ = 118.82, $M_{in-service}$ = 115.40; U = 6560.0, z = -0.40, p = .690), suggesting similar perceptions across both groups. For following progress in the field, pre-service teachers have a higher mean rank compared to in-service teachers ($M_{pre-service}$ = 121.55, $M_{in-service}$ = 113.00), but the difference is not statistically significant (U = 6262.0, z = -1.00, p = .318).

Table 4: The Readiness of Teachers for Humanoid Robots Use in Education, Based on Their Teacher Status

	Pre-service		In-service		Mann-Whitney
	N	MR	N	MR	
I wish to use robots in teaching as soon as possible.	109	113.03	124	120.48	U = 6325.5, z = -0.87, p = .383
I am interested in the field of application and integration of robots into teaching.	109	118.19	124	115.96	U = 6628.5, z = -0.26, p = .794
I see significant potential in using robots in teaching in general.	109	118.19	124	115.95	U = 6628.0, z = -0.263, p = .793
I see significant potential in using robots in my specific subject area.	109	118.82	124	115.40	U = 6560.0, z = -0.40, p = .690
I follow progress in this field.	109	121.55	124	113.00	U = 6262.0, z = -1.00, p = .318

3.3 The Readiness of Teachers for the Use of Humanoid Robots in Education Based on Their Teaching Level

Table 5 offers a comparative analysis of the readiness of primary and secondary school teachers for adopting humanoid robots in an educational context, based on their responses to five different statements.

The analysis shows distinct readiness patterns between primary and secondary school teachers (Table 5). Secondary school teachers have a higher mean rank for readiness to use robots when compared to primary school teachers ($M_{primary}$ = 108.24, $M_{secondary}$ = 125.99), with a statistically significant difference (U = 5751.0, z = -2.08, p = .037). This indicates greater readiness among secondary school teachers to engage with robotic technologies, with an effect size of -0.136, suggesting a small to medium difference in this aspect. Both primary and secondary school teachers

show similar interest levels in robot application and integration (M_{pimary} = 112.03, $M_{secondary}$ = 122.10), with no significant difference (U = 6198.5, z = -1.18, p = .237). They also perceive a similar level of potential in using robots for teaching in general ($M_{primary}$ = 118.48, $M_{secomdary}$ = 115.48; U = 6610.0, z = -0.35, p = .724) and in specific subject areas ($M_{primary}$ = 117.38, $M_{secondary}$ = 116.61); U = 6740.5, z = -0.09, p = .929). This indicates a uniform perception across both educational levels. However, secondary school teachers show a significantly higher mean rank in following advancements in the field compared to primary school teachers ($M_{primary}$ = 107.50, $M_{secondary}$ = 126.75) with a significant difference (U = 5663.5, z = -2.26, p = .024), suggesting that secondary school teachers may be more engaged in or aware of the latest developments in educational robotics, with an effect size of -.148, indicating a small to medium difference.

Table 5: The Readiness of Teachers for Humanoid Robots Use in Education, Based on Their Teaching Level

	Primary school		Secondary school		Mann-Whitney
	N	MR	N	MR	
I wish to use robots in teaching as soon as possible.	118	108.24	115	125.99	U = 5751.0, z = -2.08, p = .037
I am interested in the field of application and integration of robots into teaching.	118	112.03	115	122.10	U = 6198.5, z = -1.18, p = .237
I see significant potential in using robots in teaching in general.	118	118.48	115	115.48	U = 6610.0, z = -0.35, p = .724
I see significant potential in using robots in my specific subject area.	118	117.38	115	116.61	U = 6740.5, z = -0.09, p = .929
I follow progress in this field.	118	107.50	115	126.75	U = 5663.5, z = -2.26, p = .024

3.4 The Readiness of Teachers for the Use of Humanoid Robots in Education Based on Their Teacher Status and Teaching Level

This section (Tables 6, 7, 8, 9, and 10) assesses teachers' readiness to integrate humanoid robots into education, categorized by teacher status (pre-service or in-service) and teaching level (primary or secondary school), across five aspects.

The Readiness to Immediately Implement Humanoid Robots in Education

Table 6: Teacher Readiness to begin using Humanoid Robots in Education as soon as possible by Teaching Level and Teacher Status

Teaching level	Teacher status	M	SD	N
Primary school	In-service	2.16	1.001	38
	Pre-service	2.40	1.014	80
	Total	2.32	1.012	118
Secondary school	In-service	2.71	1.187	86
	Pre-service	2.45	1.121	29
	Total	2.64	1.171	115
Total	In-service	2.54	1.158	124
	Pre-service	2.41	1.038	109
	Total	2.48	1.103	233

Both primary and secondary level teachers, whether pre-service or in-service, show varying degrees of readiness to use robots in teaching as soon as possible. Mean and standard deviation values (Table 6) indicate the central tendency and dispersion of readiness scores across different groups. The two-way ANOVA test results suggest no significant interaction effect between the level of education and teacher status on this aspect of readiness (F (1, 229) = 2,499, p = .115).

Interest in Humanoid Robot Application and Integration

Table 7: Interest in Humanoid Robot Application and Integration in Education by Teaching Level and Teacher Status

Teaching level	Teacher status	M	SD	N
Primary school	In-service	2.76	1.324	38
	Pre-service	3.10	1.176	80
	Total	2.99	1.230	118
Secondary school	In-service	3.20	1.309	86
	Pre-service	3.21	1.177	29
	Total	3.20	1.272	115
Total	In-service	3.06	1.324	124
	Pre-service	3.13	1.171	109
	Total	3.09	1.252	233

Interest levels vary among teachers based on their teaching level and teacher status. The mean ranks (Table 7) suggest that, on average, teachers are moderately interested in applying and integrating robots into teaching. However, the two-way ANOVA test indicates no significant difference based on the level of education and

teacher status, suggesting that interest is relatively uniform across these groups (F (1, 229) = .807, p = .370).

Perceived General Potential of Humanoid Robots in Education

Table 8: Perceived General Potential of Humanoid Robots in Education by Teaching Level and Teacher Status

Teaching level	Teacher status	M	SD	N
Primary school	In-service	2.61	1.198	38
	Pre-service	2.89	1.055	80
	Total	2.80	1.106	118
Secondary school	In-service	2.83	1.210	86
	Pre-service	2.62	1.208	29
	Total	2.77	1.208	115
Total	In-service	2.76	1.205	124
	Pre-service	2.82	1.099	109
	Total	2.79	1.155	233

Teachers' perceptions of the general potential of robots in teaching indicate a moderate recognition of potential across groups (Table 8). The two-way ANOVA test results show no significant interaction effect between the level of education and teacher status, meaning that both primary and secondary teachers, whether pre-service or in-service, generally perceive similar potential in using robots (F (1, 229) = 2.089, p = .150).

Perceived Subject-Specific Potential of Humanoid Robots in Education

Table 9: The Perception of Subject-Specific Potential of Humanoid Robots in Education by Teaching Level and Teacher Status

Teaching level	Teacher status	M	SD	N
Primary school	In-service	2.53	1.156	38
	Pre-service	2.83	1.088	80
	Total	2.73	1.114	118
Secondary school	In-service	2.78	1.241	86
	Pre-service	2.62	1.178	29
	Total	2.74	1.222	115
Total	In-service	2.70	1.216	124
	Pre-service	2.77	1.111	109
	Total	2.73	1.166	233

The mean scores across groups (Table 9) suggest a moderate perception of potential, with no significant differences found between teachers according to their teaching level and teacher status based on the two-way ANOVA test results (F (1, 229) = 1.802, p = .181).

Engagement in Advances in Humanoid Robots in Education

Table 10: Engagement in Progress in the Field of Humanoid Robots in Education by Teaching Level and Teacher Status

Teaching level	Teacher status	M	SD	N
Primary school	In-service	1.89	.924	38
	Pre-service	2.48	1.067	80
	Total	2.29	1.055	118
Secondary school	In-service	2.62	1.200	86
	Pre-service	2.72	1.222	29
	Total	2.64	1.201	115
Total	In-service	2.40	1.167	124
	Pre-service	2.54	1.110	109
	Total	2.46	1.141	233

In this section, the readiness to follow progress in the field of humanoid robots in education is assessed. The mean scores (Table 10) indicate that teachers are moderately keeping up with advancements, with no significant interaction effect found between the level of education and teacher status based on the two-way ANOVA test results (F (1, 229) = 2.107, p = .148).

4   Discussion

The study reveals a moderate readiness among teachers for integrating humanoid robots into teaching, characterized by a cautious approach and varied opinions. This is supported by average scores that are not strongly positive and high standard deviations across survey items, indicating a broad spectrum of readiness possibly influenced by factors like personal experience with technology and technological comfort. The varied readiness among educators, as evidenced by high standard deviations across survey items, may reflect their diverse experiences with the core definition of humanoid robots as programmable entities that that resemble and act like humans, a concept established by Graefe and Bischoff (2003) and Ting et al. (2014). Although participants were provided with definition to ensure a uniform starting point for the survey, differences in readiness, based on their experiences,

could still emerge. While the moderate level of readiness, coupled with a recognition of potential benefits, highlights a general openness to using robots in educational settings, This general openness among educators to incorporate humanoid robots into their teaching practices aligns with the novel and interactive learning experiences these robots are known to provide, as noted by Dautenhahn (2007) and Engwall and Lopes (2002).

Comparing this study to previous research, it aligns with the cautious optimism noted in works of Lytridis et al. (2020) and Tuna et al. (2019), while addressing concerns similar to those described by Sharkley (2016) and Rani (2022). The cautious yet optimistic readiness among educators echoes the benefits documented by Belapme et al. (2018) and Movellan et al. (2009), particularly enhancing learning outcomes through interactive and engaging methods. This study examines readiness across various educator settings, contributing insight into the field. However, its sampling method may limit the generalizability of the findings. The absence of significant differences in readiness between pre-service and in-service teachers suggest a broadly uniform approach to robot integration in education. Yet, observed differences between primary and secondary school teachers hint a varying readiness level, which may be influenced by factors such as curriculum complexity and technological familiarity.

The study's primary hypothesis was to assess educators' readiness for integrating humanoid robots into the educational process, aiming to provide a foundational understanding of readiness across different educational levels and statuses. While this goal has been achieved, the study's findings serve as prompt for further research rather than a basis for immediate targeted interventions. The open questions about specific factors influencing individual readiness and the long-term impact of robot integration on teaching practices highlight the need for future studies to explore these aspects in greater detail, particularly through longitudinal research and by expanding participant diversity. The findings resonate with the practical applications of humanoid robots in education, such as those demonstrated by Breßler and Mohnke (2023), where the NAO robot significantly improved reading skills and facilitated interactive discussions.

Interest in extending the scope of research to include teacher attitudes towards robots in general, beyond humanoid forms, acknowledges the diverse potential applications of robotic technology in education. This broader perspective might reveal differing levels of acceptance and readiness, influenced by the perceived utility, ease of integration, and the specific educational outcomes associated with different types of robots. Furthermore, understanding the psychological, sociological, and ethical dimensions underlying teacher engagement with robotic technologies becomes imperative. The potential of humanoid robots to advance language learning and reduce student stress, as demonstrated by Kanda et al. (2004) and Buchem and Thomas (2022), underscores the versatility of these technologies in meeting diverse educational needs.   An exploration into the pedagogical implications of robotic aids, assessing their impact on student engagement and learning outcomes, will be crucial. While this study focused on educators' perspectives and readiness to integrate such technologies, the conceptual alignment with findings from other research, such as Chin et al. (2011), suggests potential for student engagement in classroom settings where humanoid robots are introduced. Future research should aim to understand how robotic technologies, in their myriad forms, can complement traditional teaching methods, enhance learning experiences, and equip students with the skills necessary for a technologically advanced future. The readiness and cautious optimism among educators also relate to the technical attributes of humanoid robots, such as their programmability and lifelike interactions, features that Tuna et al. (2019) emphasize as critical for effective educational integrationBy emphasizing the need for detailed exploration of educators' specific needs and challenges related to robot integration, this study sets the stage for future research to build upon its findings and contribute to the effective and thoughtful incorporation of robots into education.

5   Conclusions

The primary objective of this research was to assess the readiness of educators for the integration of humanoid robots into educational settings. This endeavor sought to understand the extent to which teachers are prepared to embrace this innovative technology. This study uncovered a moderate level of readiness among educators, characterized by a mixture of cautious optimism and reservations. The main findings reveal that while there is an interest in exploring the potential of humanoid robots in education, concerns regarding the practical challenges of integration,

technological comfort levels, and the potential impacts on student development persist. These results are crucial in identifying the mixed sentiments educators hold towards the adoption of such technologies in teaching and learning environments.

A notable limitation of this research is its sampling methodology, which might restrict the generalizability of the findings. The study's scope, focused on humanoid robots, also points to the need for broader exploration into educators' attitudes towards various types of robotic technologies and the specific applications they might have in education. A key limitation of this study is the survey's design, which included only five scaled questions. This limited scope restricts our analysis of the high variability in responses, as we could not delve into deeper causes beyond noting the absence of significant group differences. While providing initial insights into educator readiness for integrating humanoid robots, the study does not comprehensively evaluate their attitudes. Future research should expand the survey scope and methodology to more accurately assess and understand the factors influencing educators' attitudes, crucial for developing targeted educational interventions.

This research contributes to the broader understanding of the problem by highlighting the nuanced perspectives of educators on the integration of humanoid robots in education. It underscores the importance of addressing both the opportunities and challenges posed by this technological advancement. The study calls for further detailed research to delve into the specific needs, preferences, and apprehensions of educators regarding robotic integration. By doing so, it aims to pave the way for more informed, effective, and ethical strategies to harness the potential of robots in enhancing educational outcomes.

References

Akram, H., Hussein Abdelrady, A., Al-Adwan, A. S., Ramzan, M. (2022). Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. *Frontiers in Psychology, 13*, 920317. https://doi.org/10.3389/fpsyg.2022.920317

Alcorn, A. M., Ainger, E., Charisi, V., Mantinioti, S., Petrović, S., Schadenberg, B. R., Tavassoli, T., & Pellicano, E. (2019). Educators' views on using humanoid robots with autistic learners in special education settings in England. *Frontiers in Robotics and AI, 6*: 1–15. http://dx.doi.org/10.3389/frobt.2019.00107

Alkhateeb, M. A. (2018). The degree practices for mathematics teachers STEM education. Cypriot *Journal of Educational Sciences, 13*(2), 360–371. Https://files.eric.ed.gov/fulltext/EJ1193415.pdf

Ballantine, J. H., & Spade, J. Z. (2006). *Schools and society: Sociological approach to education, 3rd editi*on. Pine Forge Press.

Belpaeme, R., Kennedy, J., Ramachandran, S., Scassellati, B., & Tanaka, F. (2018). Social robots for education: A review. *Science Robotics, 3*(21), eaat5954. http://dx.doi.org/10.1126/scirobotics.aat5954

Breßler, J., & Mohnke, J. (2023). Can a humanoid robot motivate children to read more? Yes, it can! In P. Zaphiris, A. Ioannou, (Eds.), *Learning and Collaboration Technologies. HCII 2023. Lecture Notes in Computer Science, vol. 14041.* Springer, Cham. https://doi.org/10.1007/978-3-031-34550-0_19

Buchem, I., & Thomas, E. (2022). A breathing exercise with the humanoid robot NAO designed to reduce student stress during class: Results from a pilot study with students in higher education. In L. Gómez Chova, A. López Martínez, J. Lees (Eds.), *ICERI2022 Proceedings. 15th International Conference of Education, Research, and Innovation, November 7th-9th, 2022, Seville, Spain* (pp. 6545–6551). IATED Academy. https://doi.org/10.21125/iceri.2022.1639

Chin, K. Y., Wu, C. H., & Hong, Z. W. (2011). A humanoid robot as a teaching assistant for primary education. *2011 Fifth International Conference on Genetic and Evolutionary Computing, Kitakyushu, Japan*, (pp. 21–24). IEEE. http://dx.doi.org/10.1109/ICGEC.2011.13

Chocaro, R., Cortinas, M., & Marcos-Matas, G. (2023). Teachers' attitudes towards chatbots in education: A technology acceptance model approach considering the effect of social language, bot proactiveness, and users' characteristics. *Educational Studies, 49*(2), 295–313. https://doi.org/10.1080/03055698.2020.1850426

Christodoulou, P., Reid. A. A. M., Pnevmatikos, D., de Rio, C. R., & Fachantidis, N. (2020). Students participate and evaluate the design and development of a social robot. In *Proceedings of the 2020 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Naples, Italy, 21 August–4 September 2020* (pp. 739–744). http://dx.doi.org/10.1109/RO-MAN47096.2020.9223490

Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education policy analysis archives, 8*(1), 1–44.

Dautenhahn, K. (2007). Socially intelligent robots: Dimensions of human-robot interaction. *Philosophical Transactions of the Royal Society B: Biological Sciences, 362*(1480), 679–704. https://doi.org/10.1098%2Frstb.2006.2004

Demirbilek, M. (2022). IT and technology & design teachers views on utilizing robots in instruction. In P. Dankers, M. Koc, & M. L. Ciddi (Eds.), *Proceedings of ICEMST 2022, international Conference on Education in Mathematics, Science and Technology, Antalya, Turkey*, (pp. 169–174). ISTES Organization.

Engwall. O., & Lopes, J. (2022). Interaction and collaboration in robot-assisted language learning for adults. *Computer Assisted Language Learning, 35*(5–6), 1273–1309. https://doi.org/10.1080/09588221.2020.1799821

Gouraguine, S., Salhi, I., Riad, M., Qbadou, M., Mansouri, K. (2023). Towards a humanoid teaching assistant-robot-primitives knowledge modeling. In A. E. Hassanien, V. Snášel., M. Tang, T. W. Sung, & K. C. Chang (Eds.), *Proceedings of the 8th International Conference on Advanced Intelligent Systems and Informatics 2022. AISI 2022. Lecture Notes on Data Engineering and Communication Technologies, vol. 152.* Springer, Cham. https://doi.org/10.1007/978-3-031-20601-6_66

Graege, V., & Bischoff, R. (2003). Past, present and future of intelligent robots. *Proceedings of the IEEE International Symposium on Computational Intelligence in Rubotia and Automation, Kobe, Japan*, 2, pp. 801–810.

Istenič, A., Bratko, I., & Rosanda, V. (2021). Are pre-service teachers disinclined to utilise embodied humanoid social robots in the classroom? *British Journal of Educational Technology, 56*(6), 2340–2358. http://dx.doi.org/10.1111/bjet.13144

Kanda, T., Hirano, T., Eaton, D., & Ishiguro, H. (2004). Participation of interactive humanoid robots in human society – application to foreign language education. *Journal of the Robotics Society of Japan, 22*(5), 636–647. http://dx.doi.org/10.7210/jrsj.22.636

Kennedy, J., Baxter, P., Senft, E., & Belpaeme, T. (2015). Higher nonverbal immediacy leads to greater learning gains in child-robot tutoring interactions. In A. Tapus, E. André, J. C. Martin, F. Ferland, M. Ammi (Eds.), So*cial Robotics. ICSR 2015. Lecture Notes in Computer Science* (pp. 327–336). https://doi.org/10.1007/978-3-319-25554-5_33

Kerneža, M., Martinc, U., & Zemljak, D. (2023). Teachers and their predictions of emotional interaction with robots in the learning process. In B. Aberšek, & M. Cotič (Eds.), *Challenges and Transformation of Education for 21st Century Schools* (pp. 391–424). Cambridge Scholars Publishing.

Lytridis, C., Bazinas, C., Papakostas, G. A., & Kaburlasos, V. (2020). On measuring engagement level during child-robot interaction in education. In M. Merdan, W. Lepuschitz, G. Koppensteiner, R. Balogh, D. Obdržálek (Eds.), *Robotics in Education. RiE 2019. Advances in Intelligent Systems and Computing, 1023.* https://doi.org/10.1007/978-3-030-26945-6_1

Maio, G. R., & G. Haddock. (2010). *The psychology of attitudes and attitude change.* Sage.

Movellan, J., Eckhardt, M., Virnes, M., & Rodriguez, A. (2009). Sociable robot improves toddler vocabulary skills. In *Proceedings of the 4th ACM/IEE International Conference on Human Robot Interaction, HRI 2009, La Jolla, California, USA; March 9–13* (pp. 307–308). http://dx.doi.org/10.1145/1514095.1514189

Nunnally, J. C. (1978). *Psychometric theory.* McGraw Hill.

Ospennikova, E., Ershov, M., & Iljin, I. (2015). Educational robotics as an innovative educational technology. *Procedia – Social and Behavioral Sciences, 214,* 18–26. http://dx.doi.org/10.1016/j.sbspro.2015.11.588

Pande, A., & Mishra, D. (2023). The synergy between humanoid robot and a whisperer: Bridging a gap in education. *Electronics, 12*(19), 3995. http://dx.doi.org/10.3390/electronics12193995

Rani, A., Pande, A., Parish, K., & Mishra, D. (2023). Teachers' perspective on robots inclusion in education – a case study in Norway. In M. Kurosu, A. Hashizume (Eds.), *Human-Computer Interaction. HCII 2023. Lecture Notes in Computer Science, vol. 14013.* Springer, Cham. https://doi.org/10.1007/978-3-031-35602-5_12

Reich-Stiebert, N., & Eyssel, F. (2016). Robots in the classroom: What teachers think about teaching and learning with education robots. In A. Agah, J. J. Cabibihan, A. Howard, M. Salichs, & H. He (Eds.), *Social Robotics. ICSR 2016. Lecture Notes in Computer Science, vol. 9979* (pp. 671–680). https://doi.org/10.1007/978-3-319-47437-3_66

Sailer, M., Stadler, M., Schultz-Pernice, F., Franke, U., Schoffmann, C., Paniotova, V., Husagic, L., & Fischer, F. (2021). Technology-related teaching skills and attitudes: Validation of a scenario-based self-assessment instrument for teachers. *Computers in Human Behavior, 115,* 106625. https://doi.org/10.1016/j.chb.2020.106625

Sharkey, A. J. (2016). Should we become robot teachers? *Ethics and Information Technology, 18*(4), 283–297. https://link.springer.com/article/10.1007/s10676-016-9387-z

Ting, C. H., Yeo, W. H., King, Y. J., Chuah, Y. D., Lee, J. V., & Khaw, W. B. (2014). Humanoid robot: A review of the architecture, applications and future trend. *Research Journal of Applied Sciences, Engineering and Technology, 7*(7), 1364–1369.

Tsang, A. (2020). Why English accents and pronunciation 'still' matter for teachers nowadays: A mixed methods study on learners' perceptions. *Journal of Multilingual and Multicultural Development, 41*(2), 1–17. http://dx.doi.org/10.1080/01434632.2019.1600528

Tuna, G.. Tuna, A., Ahmetoglu, E., & Kuscu, H. (2019). A survey on the use of humanoid robots in primary education: Prospects, research challenges and future research directions. Cypriot *Journal of Educational Sciences, 14*(3), 361–373. http://dx.doi.org/10.18844/cjes.v14i3.3291

Wang, K., Sang, G. Y., Huang, L. Z., Li, S. H., & Guo, J. W. (2023). The effectiveness of educational robots in improving learning outcomes: A meta-analysis. *Sustainability, 15*(5), 4637. https://doi.org/10.3390/su15054637

Yang, G. Z. (2019). Robot learning-beyond imitation. *Science Robotics, 4*(26), eaaw3520. http://dx.doi.org/10.1126/scirobotics.aaw3520

Yoshida, E. (2019). Robots that look like humans: A brief look into humanoid robotics. *Metode Science Studies Journal, 9*, 143–151. http://dx.doi.org/10.7203/metode.9.11405

Zemljak, D., & Kerneža, M. (2023). Sustainable education model for humanoid robot integration in educational process. In L. Gómez Chova, A. López Martínez, J. Lees (Eds.), *EDULEARN23 Proceedings, 15th International Conference on Education and New Learning Technologies, July 3rd–5th, 2023, Palma, Spain* (pp. 4274–4282). IATES Academy. https://doi.org/10.21125/edulearn.2023.1130

Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

Polona Jančič Hegediš, Urška Doberšek,
Monika Mithans
University of Maribor, Faculty of Education, Maribor, Slovenia
polona.jancic1@um.si, urska.dobersek98@gmail.com, monika.mithans1@um.si

The choice of textbook is important to the quality of the educational process as the textbook is the most frequently chosen teaching material in environmental studies. It should align with didactic recommendations encouraging an active role for students in the educational process, which is facilitated using operational–practical methods. The research aimed to examine the tasks in the textbooks for environmental studies and to identify those oriented towards operational–practical work. The research sample included textbooks from four publishing houses. The study used a descriptive non-experimental method of pedagogical research. We separately analysed the textbooks from each of the four publishers for each grade. The results show that the presence of tasks oriented towards operational–practical methods vary by grade and publisher. The largest number of tasks focusing on the use of operational–practical methods was found in the textbooks for third grade, followed by first and second grade.

University of Maribor Press

Naloge, ki usmerjajo k uporabi operacijsko-praktičnih učnih metod v učbenikih za predmet spoznavanje okolja

Polona Jančič Hegediš, Urška Doberšek, Monika Mithans

Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
polona.jancic1@um.si, urska.dobersek98@gmail.com, monika.mithans1@um.si

Izbira učbenika je pomemba za kakovost vzgojno-izobraževalnega procesa, saj je učbenik najpogosteje izbrano učno gradivo pri predmetu spoznavanje okolja. Zaželeno je, da je usklajen z didaktičnimi priporočili in sodobnimi didaktičnimi smernicami, ki spodbujajo aktivno vlogo učencev v izobraževalnem procesu, kar omogoča predvsem uporaba operacijsko-praktičnih učnih metod. Z uporabo operacijsko-praktičnih metod pri pouku učenci dosežejo učne cilje skozi različne dejavnosti. Namen raziskave je bil preučiti naloge v učbenikih predmeta spoznavanje okolja in prepoznati tiste, ki usmerjajo k operacijsko-praktičnemu delu. V raziskovalni vzorec smo vključili učbenike štirih založb. Pri raziskavi smo uporabili deskriptivno-neeksperimentalno metodo pedagoškega raziskovanja. Pri vsaki izmed štirih založb smo analizirali učbenike za vsak razred posebej. Rezultati analize so pokazali, da se prisotnost nalog, ki usmerjajo k operacijsko-praktičnim učnim metodam, razlikuje glede na razred in založbo. Največ nalog, ki usmerjajo k uporabi operacijsko-praktičnih metod, vsebujejo učbeniki za 3. razred, sledi 1. razred in nato 2. razred.

P. *Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies*

227

1 Introduction

A textbook is a learning tool intended for use by both students and teachers (Remillard, 2005). It can be used in the function of the teacher's teaching or in the function of the student's learning activity or learning (Štefanc, 2005). The main characteristic of a textbook is that through didactic transformation of scientific content, it appropriately structures, restructures and simplifies it, and as a teaching tool and learning resource, it contributes to the effectiveness of instruction and self-directed learning (Kovač et al., 2005).

A good textbook is a student's most important source of knowledge, helping them to acquire knowledge and contributing to their personal development (Cigler, 1997). Teachers consider textbooks to play a fundamental role in the teaching process (Herlinda, 2014) and often closely follow them in the delivery of material, which also influences the choice of didactic strategies and learning content (Hadar, 2017).

As criteria for official quality standards for teaching materials in Slovenia, we can consider the guidelines set out in Article 3 of the 2015 Textbook Validation Regulations. According to this regulation (2015, Article 3), the competent professional council may approve a textbook that:

- is aligned with the current curriculum or knowledge catalogue in terms of objectives, knowledge standards and content,
- is in line with current knowledge in the subject discipline,
- is appropriate from a methodological–didactic point of view,
- complies with the norms and criteria for reducing the weight of school bags adopted by the Slovenian Institute of Education,
- is appropriate for the developmental level and age of the participants in the educational process, and
- is linguistically correct and appropriate, aesthetically and visually pleasing and technically adequate.

A good textbook also needs to look attractive and use language that is close to the learners (Cigler, 1997).

In relation to the quality of the textbook, didactic principles should also be taken into account, as they are the basic guidelines for teaching and, according to Strmčnik (2001), are an important theoretical basis for both teaching and education. This is the reason they also play an important role in the delivery of the learning content in the textbook. Referring to the didactic principles, Kovač et al. (2005) believed that a good textbook is one that meaningfully incorporates all the principles relevant to the textbook in its content and format. Thus, when assessing the quality of the content of a textbook, it is essential to consider the principles of illustrativeness, factual– logical correctness, and the structural and systematic nature of instruction. From the point of view of the relationship with the student, the most important principle is that of developmental proximity, individualisation and education. From the point of view of the student's activity, the principle of activity and problem-orientation must be observed; and from the point of view of the organisation of the learning process, the principle of economy and rationality.

Adhering to all these principles enables students to better understand the content, encourages them to actively participate and reflect and contributes to more effective teaching.

A quality educational process includes preparing and introducing students to new learning content, addressing new learning content, practicing activities, reviewing content for sustainable knowledge and testing knowledge. Therefore, as early as 1983, Poljak stressed that these phases must be considered and included in the didactic design of textbooks (Poljak, 1983).

A modern and high-quality textbook cannot be a mere 'mechanical,' didactic transformation of scientific content but must also promote active learning, a deeper understanding of the content and cross-curricular integration (Turk Škraba, 2006); stimulate students' curiosity and creativity; and allow students to individualise (Cigler, 1997). It is important that textbooks are designed to support students' learning of the material while complementing or extending other educational resources. Only if they are appropriately didactically designed will teachers be able to effectively use them at all stages of the learning process (Poljak, 1983).

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

229

Therefore, a quality textbook can support both students and teachers in learning and teaching (Swanepoel, 2010). This is the reason the choice of textbook is important to the quality of the educational process.

This is why we decided to analyse the tasks in the textbooks in more detail. We focused on the textbooks of environmental cognition and on those tasks that orient students towards operational–practical methods since the didactic recommendations for environmental cognition classes guide to active knowledge acquisition, which is facilitated, in particular, by operational–-practical methods.

2   Textbooks in environmental studies

The most important general objectives of environmental studies are to understand the environment and to develop cognitive skills. Both objectives can be pursued by having students actively learn about the environment. The knowledge they acquire can be applied to both the natural and the social environments. In the environmental studies subject, students should be given the opportunity to develop their abilities to compare, classify, organise, measure, record data, make predictions and inferences, experiment and communicate (Primary school programme environmental studies. Curriculum, 2011). Students actively acquire knowledge that influences their understanding (Ivanuš Grmek et al., 2009). Teachers are obviously more than encouraged by the curriculum of the subject to introduce operational–-practical methods into their teaching practices (Valenčič Zuljan & Kalin, 2020).

Valenčič Zuljan and Kalin (2020) included the following among the operational–-practical methods:

1. A method of research that focuses on the student's exploration. This can take the form of non-experimental exploration of objects, phenomena and processes in natural or stimulating circumstances or of experimental exploration.
2. A method of practical work, movement and other activities that involve students in hands-on activity, transforming objects and making products.
3. Written composition method, in which is combined with the teaching methods of explanation, discussion, demonstration and working with text, as well as other teaching methods classified as operational–practical. Note-

taking is an important skill that is crucial for successful learning in all subjects.

4. Drawing based method in which teachers and students express parts of the learning material through graphic activities—symbols, drawings, illustrations, diagrams, charts, maps, plans, etc.

5. A game-based method in which simulations and role play in the social studies contribute to critical thinking that, in turn, helps to reflect on social phenomena and problems. Simulations and role play games contribute to making sense of what has been learnt and to the applicability of knowledge to life.

Hus and Čagran (2008) studied the didactic characteristics of textbook sets in environmental studies by examining the representation of methods in a selected textbook set from three different publishers. Based on the results of the study, they concluded that the textbook sets preferentially emphasised traditional methods, such as explanation, discussion, demonstration and work within the textbook. In contrast, modern methods that follow constructivist principles of teaching were noticeably less present in these textbook sets. According to the teachers, project work and fieldwork methods were the least present in the textbook sets. According to other research conducted in Slovenia, project work and fieldwork rarely appear in pedagogical practice (Jančič Hegediš & Hus, 2019; Mithans et al., 2023).

Textbooks for the subject of environmental studies differ from one another in terms of promoting constructivist elements, which include guiding students towards more active forms of learning (Hus, 2013).

In a study exploring the content-didactic and professional aspects of textbooks for environmental studies, Čagran et al. (2018) found that all teachers rated environmental studies textbooks as accompanying professional examples with illustrations (100%). The majority also believed that textbooks use examples from everyday life (93%); address current scientific knowledge (83%); allow cross-curricular integration (80%); are appropriate to the developmental level of the students (73%); encourage active learning (73%); enrich vocabulary (67%); allow for integration (67%) and testing (64%) of students' prior knowledge; and encourage creative thinking (60%).

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

231

Given the pivotal role of textbooks in shaping the educational experience, understanding how these resources engage students in active learning practices is essential.

3 Methodology

The purpose of the research was to determine the tasks in textbooks for the subject of environmental studies that direct students towards operational–practical methods.

The following research questions guide the study:

1. What is the frequency and distribution of tasks that promote operational-practical methods in environmental studies textbooks across different grades and publishers?
2. What is the proportion of tasks oriented towards operational-practical methods in relation to each thematic section within the textbooks?
3. How are different types of operational-practical methods represented in the tasks across the textbooks?
4. What is the relationship between tasks that focus on operational-practical methods and the global objectives outlined in the environmental studies curriculum?

Descriptive non-experimental methods of pedagogical research were used.

Textbooks from the four largest publishers in Slovenia that the Slovenian Council has approved of Experts were selected for the research sample.

The research sample included the following textbook publishers (listed in random order):

- DZS: Skribe Dimec et al. (2012), Skribe Dimec et al. (2013), Umek et al. (2014)
- Mladinska knjiga: Hergan et al. (2014a), Hergan et al. (2014b), Hergan et al. (2015)

- Modrijan: Krnel et al. (2015), Krnel et al. (2016), Krnel et al. (2017), Krnel et al. (2018)
- Rokus Klett: Grošelj and Ribič (2013), Šefer and Kumše (2015), Grošelj and Ribič (2016)

The publishing houses were labelled A, B, C and D.

Tasks in the textbooks were analysed with the help of pre-prepared instrument. The instrument consisted of the criteria (such as task frequency, alignment with educational objectives and method diversity) used to analyse the pictorial material in the textbooks. Each textbook was evaluated separately, categorizing tasks according to their methodological focus and relevance to operational–practical method. The data obtained from the analyses were presented by indicating the absolute (f) and percentage frequencies (f%).

4   Results

The results are presented in subchapters according to research questions.

4.1   The results of the analysis of the number of tasks oriented towards operational–practical methods by grade and publishers

First, we checked to see how many of the tasks in the environmental studies textbooks promoted the use of operational–practical methods.

Table 1: Number of tasks focusing on operational–practical methods by grade and publishers

Criterion	Publishers	1st grade	2nd grade	3rd grade	Total by publishers
Number of tasks that focus on operational–practical methods	A	16 (20.25 %)	21 (26.58 %)	42 (53.16 %)	79 (100.00 %)
	B	3 (15.79 %)	14 (73.68 %)	2 (10.53 %)	19 (100.00 %)
	C	30 (31.58 %)	16 (16.84 %)	49 (51.58 %)	95 (100.00 %)
	D	70 (64.81 %)	9 (8.33 %)	29 (26.85 %)	108 (100.00 %)
Total by grade		119 (39.53 %)	60 (19.93 %)	122 (40.53 %)	301 (100.00 %)

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

233

Table 1 shows that the textbooks of the three grades are quite different in the number of tasks that focus on operational–practical methods. Overall, by grade, the highest proportion of such tasks appears in the textbooks for Grade 3 (40.53%), followed by Grade 1 (39.53%) and then Grade 2 (19.93%). By publisher, overall, the highest proportion of tasks focusing on operational–practical methods appears in the textbooks by Publisher D. This is followed by those by Publisher C, then by Publisher A, and the lowest proportion of such tasks appears in the textbooks by Publisher B. The highest proportion of tasks is found in the textbooks by Publisher D, followed by those by Publisher C, then by Publisher A, and the lowest proportion of such tasks is in the textbooks by Publisher B.

4.2 The results of the analysis of the ratio of tasks leading to operational–practical methods according to the thematic strands

In the curriculum, the objectives are written in the following didactic strands: Time, Space, Substances, Forces and Movements, Phenomena, Living beings, Human, Self, Communities, Relationships, Transport and Environmental education (Primary school programme environmental studies. Curriculum, 2011). In the research, we were interested in which thematic strands found in the tasks that focus on the use of operational–practical methods occur in greater numbers. The results are shown in Table 2.

**Table 2: Number of tasks focusing on operational–
practical methods by subject by grade and publisher**

Publisher / Thematic strand	1st grade				
	A	B	C	D	Total by thematic strand
Time	2 (12.5 %)	0 (0.00 %)	4 (13.33%)	7 (10.00 %)	13 (10.92 %)
Space	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	5 (7.14 %)	5 (4.20 %)
Substances	2 (12.5 %)	0 (0.00 %)	7 (23.33 %)	13 (18.57 %)	22 (18.49 %)
Forces and movements	1 (6.25 %)	0 (0.00 %)	4 (13.33 %)	3 (4.29 %)	8 (6.72 %)
Phenomena	0 (0.00 %)	0 (0.00 %)	2 (6.67 %)	6 (8.57 %)	8 (6.72 %)
Living beings	2 (12.5 %)	1 (33.33 %)	5 (16.67 %)	6 (8.57 %)	14 (11.76 %)
Human	1 (6.25 %)	0 (0.00 %)	1 (3.33 %)	4 (5.71 %)	6 (5.04 %)
Me	4 (25.00 %)	0 (0.00 %)	3 (10.00 %)	9 (12.86 %)	16 (13.45 %)
Communities	2 (12.5 %)	2 (66.67 %)	3 (10.00 %)	6 (8.57 %)	13 (10.92 %)
Relationships	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	6 (8.57 %)	6 (5.04 %)

	A	B	C	D	
Transport	2 (12.5 %)	0 (0.00 %)	1 (3.33 %)	3 (4.29 %)	6 (5.04 %)
Environmental education	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	2 (2.86 %)	2 (1.68 %)
Total by publishers	16 (100.00 %)	3 (100.00 %)	30 (100.00 %)	70 (100.00 %)	119 (100.00 %)

	2nd grade				
Publisher / Thematic strand	A	B	C	D	Total by thematic strand
Time	10 (47.62 %)	2 (14.29 %)	2 (12.5 %)	1 (11.11 %)	15 (25.00 %)
Space	0 (0.00 %)	3 (21.43 %)	4 (25.00 %)	2 (22.22 %)	9 (15.00 %)
Substances	2 (9.52 %)	3 (21.43 %)	1 (6.25 %)	1 (11.11 %)	7 (11.67 %)
Forces and movements	1 (4.76 %)	1 (7.14 %)	1 (6.25 %)	0 (0.00 %)	3 (5.00 %)
Phenomena	0 (0.00 %)	1 (7.14 %)	1 (6.25 %)	0 (0.00 %)	2 (3.33 %)
Living beings	2 (9.52 %)	2 (14.29 %)	5 (31.25 %)	1 (11.11 %)	10 (16.67 %)
Human	0 (0.00 %)	0 (0.00 %)	1 (6.25 %)	0 (0.00 %)	1 (1.67 %)
Me	2 (9.52 %)	0 (0.00 %)	0 (0.00 %)	2 (22.22 %)	4 (6.67 %)
Communities	1 (4.76 %)	1 (7.14 %)	1 (6.25 %)	1 (11.11 %)	4 (6.67 %)
Relationships	0 (0.00 %)	1 (7.14 %)	0 (0.00 %)	0 (0.00 %)	1 (1.67 %)
Transport	3 (14.29 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	3 (5.00 %)
Environmental education	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	1 (11.11 %)	1 (1.67 %)
Total by publishers	21 (100.00 %)	14 (100.00 %)	16 (100.00 %)	9 (100.00 %)	60 (100.00 %)

	3rd grade				
Publisher / Thematic strand	A	B	C	D	Total by thematic strand
Time	4 (9.52 %)	0 (0.00 %)	3 (6.12 %)	2 (6.90 %)	9 (7.38 %)
Space	5 (11.90 %)	0 (0.00 %)	11 (22.45 %)	4 (13.79 %)	20 (16.39 %)
Substances	4 (9.52 %)	1 (50.00 %)	7 (14.29 %)	4 (13.79 %)	16 (13.11 %)
Forces and movements	4 (9.52 %)	0 (0.00 %)	2 (4.08 %)	0 (0.00 %)	6 (4.92 %)
Phenomena	6 (14.29 %)	0 (0.00 %)	2 (4.08 %)	5 (17.24 %)	13 (10.66 %)
Living beings	4 (9.52 %)	1 (50.00 %)	11 (22.45 %)	2 (6.90 %)	18 (14.75 %)
Human	3 (7.14 %)	0 (0.00 %)	4 (8.16 %)	3 (10.34 %)	10 (8.20 %)
Me	1 (2.38 %)	0 (0.00 %)	1 (2.04 %)	0 (0.00 %)	2 (1.64 %)
Communities	3 (7.14 %)	0 (0.00 %)	4 (8.16 %)	6 (20.69 %)	13 (10.66 %)
Relationships	4 (9.52 %)	0 (0.00 %)	1 (2.04 %)	2 (6.90 %)	7 (5.74 %)
Transport	1 (2.38 %)	0 (0.00 %)	3 (6.12 %)	0 (0.00 %)	4 (3.28 %)
Environmental education	3 (7.14 %)	0 (0.00 %)	0 (0.00 %)	1 (3.45 %)	4 (3.28 %)
Total by publishers	42 (100.00 %)	2 (100.00 %)	49 (100.00 %)	29 (100.00 %)	122 (100.00 %)

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

235

Table 2 shows that the number of tasks in each topic set varies by grade and by publisher. If all the publishers of Grade 1 are combined, the tasks found in the Substances topic (18.49%) stand out the most. An example of a task that guides students to use the operational–practical methods in the Substances topic is the task in which students make a paper hat. The students make a paper hat based on the pictorial procedure given (Krnel et al., 2015, p. 36).

In Grade 2, the largest number of such tasks is in the Time topic (25.00%). An example of a task that guides students to use operational–practical methods in the Time topic is a task in which students make a timeline. They bring photographs of themselves taken at different ages to school. They stick the photographs on a tape upon which the years are marked. They can also add text to the timeline. Next to the photos, they mark what was important to them at that time or year, for example, a toy or an event. They present the timeline to their classmates and display it. An example of a timeline is shown in the photo accompanying the task (Grošelj & Ribič, 2013, p. 31).

In Grade 3, the largest number of such tasks is in the thematic strand Space (16.39%). An example of a task that focuses on the use of operational–practical methods in the thematic strand Space is the task in which students visit a farm. The students visit a farm and investigate what people do on the farm, what animals are on the farm and for what purpose the animals are bred (Grošelj and Ribič, 2016, p. 20).

The largest number of such tasks in publisher A is found in the Self topic (25.00%) in Grade 1, the Time topic (47.62%) in Grade 2, and the Phenomena topic (14.29%) in Grade 3. For Publisher B, the largest number of such tasks occurs in the Communities topic (66.67%) in Grade 1, in the topics of Space (21.43%) and Substances (21.43%) in Grade 2, and in the topics of Substances (50.00%) and Living beings (50.00%) in Grade 3. For Publisher C, the largest number of such tasks occurs in the Substances topic (23.33%) in Grade 1, the Living beings topic (31.25%) in Grade 2, and in the topics of Space (22.45%) and Living beings (22.45%) in Grade 3. For Publisher D, the largest number of such tasks occurs in the Substances topic in Grade 1 (18.57%), in the topics of Space (22.22%) and Self in Grade 2 (22.22%), and in the Communities topic in Grade 3 (20.69%).

4.3   The results of the analysis of the representation of different types of operational–practical methods in assignments by grade and publisher

Table 3: Representation of different types of operational–practical methods in assignments by grade and publisher

Publisher Opera-tional–practical method	1st grade				
	A	B	C	D	Total by type of operational–practical methods
Method of research	6 (37.50 %)	1 (33.33 %)	13 (35.14 %)	16 (19.28 %)	36 (25.90 %)
Method of practical work, movement and other activities	8 (50.00 %)	1 (33.33 %)	9 (24.32 %)	27 (32.53 %)	45 (32.37 %)
Written composition method	0 (0.00 %)	0 (0.00 %)	2 (5.41 %)	6 (7.23 %)	8 (5.76 %)
Drawing based method	2 (12.50 %)	0 (0.00 %)	13 (35.14 %)	24 (28.92 %)	39 (28.06 %)
Game based method	0 (0.00 %)	1 (33.33 %)	0 (0.00 %)	10 (12.05 %)	11 (7.91 %)
Total by publishers	16 (100.00 %)	3 (100.00 %)	37 (100.00 %)	83 (100.00 %)	139 (100.00 %)
Publisher Opera-tional–practical method	2nd grade				
	A	B	C	D	Total by type of operational–practical methods
Method of research	9 (40,91 %)	9 (60,00 %)	11 (57,89 %)	7 (63,64 %)	36 (53,73 %)
Method of practical work, movement and other activities	8 (36.36 %)	4 (26.67 %)	3 (15.79 %)	1 (9.09 %)	16 (23.88 %)
Written composition method	2 (9.09 %)	0 (0.00 %)	2 (10.53 %)	2 (18.18 %)	6 (8.96 %)
Drawing based method	2 (9.09 %)	2 (13.33 %)	3 (15.79 %)	1 (9.09 %)	8 (11.94 %)
Game based method	1 (4.55 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	1 (1.49 %)
Total by publishers	22 (100.00 %)	15 (100.00 %)	19 (100.00 %)	11 (100.00 %)	67 (100.00 %)

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

237

Publisher / Operational–practical method	3rd grade				
	A	B	C	D	Total by type of operational–practical methods
Method of research	29 (60.42 %)	1 (33.33 %)	38 (59.38 %)	15 (33.33 %)	83 (51.88 %)
Method of practical work, movement and other activities	10 (20.83 %)	1 (33.33 %)	3 (4.69 %)	1 (2.22 %)	15 (9.38 %)
Written composition method	4 (8.33 %)	1 (33.33 %)	17 (26.56 %)	17 (37.78 %)	39 (24.38 %)
Drawing based method	3 (6.25 %)	0 (0.00 %)	6 (9.38 %)	12 (26.67 %)	21 (13.13 %)
Game based method	2 (4.17 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	2 (1.25 %)
Total by publishers	48 (100.00 %)	3 (100.00 %)	64 (100.00 %)	45 (100.00 %)	160 (100.00 %)

The table shows that the representation of the different types of operational–practical methods in the tasks varies by grade and publisher. In Grade 1, for Publisher A, the tasks most often direct the students to use the method of practical work, movement and other activities (50.00%). For Publisher B, there is no method that stands out in Grade 1. For Publisher C, the methods that stand out the most in Grade 1 are method of research (35.14%) and the drawing based method (35.14%). For Publisher D, the method that stands out the most in Grade 1 is the method of practical work, movement and other activities method (32.53%). Combining all Publishing Houses for Grade 1, the following results show that the method of practical work, movement and other activities stands out the most. An example of a task that is conducive to the use of the method of practical work, movement and other activities is a task in which the students create a landscape. The students are divided into groups. In groups, they imagine a landscape according to their preferences. They then use clay to form hills, plains, lakes, etc. When the clay is dry, they paint the landscape. They can also add other objects to the landscape, for example, houses and churches. Finally, they answer the question: 'Could landscapes be made with other materials?' (Šefer & Kumše, 2015, p. 69).

In Grade 2, the method of research dominates (53.73%). An example of a task that guides students to use the method of research is one in which students show the changes between day and night. For this experiment, they need a globe and a pocket torch. One student holds a lamp that is pointed at the globe to represent the sun. A second student rotates the globe on its axis. In this way, they illustrate the change between day and night (Grošelj and Ribič, 2013, p. 39). Another example of a task that guides students to use the method of research is a task in which students look for danger signs. They look for danger signs on products and explain them (Hergan et al., 2015, p. 44). A third example of a task that guides the use of the method of research is a task in which students investigate a domestic fridge. They look at and evaluate the foods that are the most and least abundant in the fridge (Krnel et al., 2016, p. 10).

In Grade 3, the method of research is also predominant (51.88%). An example of a task that guides the use of the method of research is a task in which students carry out an experiment. They place a fresh apple and a plastic jar on a windowsill. They observe them for 14 days to see what happens (Grošelj and Ribič, 2016, p. 70).

In terms of publishers, the method of research stands out for Publisher A (60.42%) as well as for Publisher C (59.38%). For Publisher B, none of the operational–practical methods stand out in Grade 3. In Publishing House D, however, the written composition method stands out (37.78%).

4.4 The results of the analysis of the relationships between the tasks oriented towards operational–practical methods and the global objectives

The most prevalent tasks among those guided by operational–practical methods in the Grade 1 textbooks are tasks that help students to achieve two different global objectives in the Substances thematic strand. These global objectives are: 'know that solids and liquids exist' and 'know how to use different materials (substances), tools and processing procedures and relate the properties of materials and processing methods: transform, cut, join, glue' (Primary school programme environmental studies. Curriculum, 2011, pp. 8–9). Both global objectives are met in 6.62% of tasks.

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

239

The most prevalent tasks among those guided by operational–practical methods in the Grade 2 textbooks are tasks that help students achieve two different global objectives in the Time thematic strand. These global objectives are: 'investigate, identify and explain events and changes in different seasons' and 'learn about the calendar' (Kolar et al., 2011, p. 7). Both global objectives are met in 5.88% of the tasks.

The most prevalent tasks among those guided by operational–practical methods in the Grade 3 textbooks are tasks that help students to achieve the global objective of the Living beings thematic strand. This is the global objective 'distinguish and describe living things and the environments in which they live and how recurring changes affect them (night–day, seasons)' (Primary school programme environmental studies. Curriculum, 2011, p.11). The global objective is met in 6.15% of the tasks.

5   Discussion

The research aimed to determine the tasks in textbooks for the subject of environmental studies that direct students towards operational–practical methods. We chose to analyse textbooks because textbooks are the most frequently chosen teaching material by teachers in the subject of environmental cognition (Filipčič, 2016).

The operational–practical methods we have analysed in the textbooks allow students to play an active role in the learning process. This approach is emphasised by many authors (Letina, 2016; Tomić, 2003; Valenčič Zuljan & Kalin, 2020). It is necessary to allow students to learn about their environment through practical activities (e.g., dressing, preparing food and drawing shadows) that require students to carry out certain procedures—observation, determining properties by experiments, sorting, arranging and communicating, predicting and measuring (Ivanuš Grmek et al., 2009).

The results show that depending on the grade, most of these tasks appear in the textbooks for Grade 3, followed by Grade 1 and then Grade 2. Among the recommendations on the selection of textbooks, workbooks and other learning materials given by the Institute of the Republic of Slovenia for Education (2022) is that the teacher should select textbooks and sets of learning materials that encourage

the active role of students (learning by discovery, problem-based learning, etc.). The data obtained were therefore also interpreted according by the publishing house to obtain information on the representation of such tasks in each publishing house. Overall, the largest number of tasks focusing on operational–practical methods is found in textbooks by publisher D, followed by textbooks by publisher C and then A, with the smallest number of such tasks found in textbooks by publisher B.

The tasks that focus on operational–practical methods have been grouped according to themes. The number of tasks in a thematic strand varies both by grade and by publisher. If we combine all the publishers of Grade 1, the tasks found in the Substances thematic strand stand out the most. In Grade 2, the largest number of such tasks is found in Time and in Grade 3, the largest number of such tasks is found in Space. Our analysis also uncovers potential areas for enhancement within the textbook content. Specifically, underrepresenting operational-practical tasks in certain thematic strands or grades suggests room for improvement. For instance, integrating more of these tasks in the 'Time' and 'Space' thematic strands across all grades could provide more balanced, comprehensive experiential learning opportunities.

We also looked at the representation of different types of operational–practical methods in the tasks. We classify the operational–practical methods as the method of research, the method of practical work, movement and other activities, the written composition method, the drawing based method and the game based method (Valenčič Zuljan & Kalin, 2020). If we combine all the first grade publishers, the method that stands out the most clearly is method of practical work, movement and other activities. In Grades 2 and 3, the method of research predominates. The exploration-oriented tasks carried out in Grade 1 are guided and then they gradually increase the student's own activity in planning experiments and investigations (Primary school programme Environmental studies. Curriculum, 2011). As the student's own activity increases, the number of tasks that focus on exploration consequently increase.

The methods we choose depend the most on the objectives. Objective factors in the choice of methods include the influence of educational goals and the educational process (Blažič et al., 2003). To gain insight into the global goals that are most prevalent in the tasks, we also analysed the representation of global goals in tasks

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

241

that focus on operational–practical methods. In each grade, a different global objective dominates these tasks. For example, in Grade 1, the tasks oriented towards the operational–practical methods in the textbooks are most dominated by tasks in which students pursue two different global objectives from the Substances thematic strand. These two global objectives are: 'know that solids and liquids exist' and 'know how to use different materials (substances), tools and processes, and relate the properties of materials and processes: transform, cut, join, glue' (Primary school programme environmental studies. Curriculum, 2011, pp. 8–-9). In Year 2, the most prevalent tasks are those in which students pursue two different global objectives from the Time thematic strand. These global objectives are: 'investigate, identify and explain events and changes in different seasons over time' and 'learn about the calendar' (Primary school programme environmental studies. Curriculum, 2011, p. 7). In Grade 3, the most predominant tasks are those in which students meet a global objective from the Living beings thematic strand. This is the global objective to 'distinguish and describe living things from the environments in which they live and how recurring changes affect them (night–-day, seasons)' (Primary school programme environmental studies. Curriculum, 2011, p. 11). By acknowledging and addressing these specific deficiencies in the representation of educational goals, teachers can create a more equitable and comprehensive educational experience that equips students with diverse skills and knowledge.

6   Conclusion

In conclusion, our findings show that the representation of tasks oriented towards operational–practical methods in textbooks varies widely by grade and publisher. The representation of researched tasks in certain grades suggests a potential disparity in students' experiential learning opportunities, which could influence their engagement and comprehension in environmental studies. If third-grade textbooks are rich in such tasks while first and second-grade materials are not, is possible that we are missing opportunities to foster early engagement and foundational understanding in younger students. Our findings can be compared with the study by Hus and Čagran (2009), who found that textbook sets emphasize traditional methods, such as explanation, discussion, demonstration and textbook work, while providing much less coverage of modern teaching methods, which according to the authors, mainly cover experimental and laboratory work and projects.

Moreover, the apparent variability in task distribution among publishers may lead to unequal learning experiences. Educators making textbook selections may need to consider these disparities critically.

The study provides more detailed information on the tasks that lead to operational–practical methods in textbooks for subject environmental studies. Curriculum developers and publishers should strive for a more balanced inclusion of operational-practical methods across all grades. This ensures that students at every educational stage have ample opportunities for active engagement and hands-on learning.

We conclude that there is still room for improvement and to enhance environmental studies education. It would be wise to refine textbook content to integrate comprehensive, interdisciplinary operational-practical methods, ensuring alignment with current pedagogical insights and societal needs for nurturing well-informed and actively engaged students.

Future research should explore the longitudinal impact of incorporating operational-practical methods in environmental studies textbooks on student engagement and learning outcomes, while also examining the variability of these methods across different educational contexts and cultures.

Additionally, expanding this research to include a variety of school subjects could provide valuable insights into the prevalence and effectiveness of operational-practical methods, fostering a more holistic understanding of active learning strategies in diverse school subject.

References

Blažič, M., Ivanuš Grmek, M., Kramar, M., & Strmčnik, F. (2003). *Didaktika.* Visokošolsko središče, Inštitut za raziskovalno in razvojno delo.

Cigler, N. (1997). Kakšen je dober učbenik, kako napraviti, izbrati in uporabljati učbenike. *Vzgoja in izobraževanje: revija za teoretična in praktična vprašanja vzgojno izobraževalnega dela, 28*(2), 34–36.

Čagran, B., Košir, K., Kranjec, E., Rus, D., & Ivanuš Grmek, M. (2018). *O kakovosti slovenskih učbenikov. Republika Slovenija.* Ministrstvo za izobraževanje, znanost in šport. https://kauc.splet.arnes.si/files/2018/11/O_kakovosti_slovenskih_ucbenikov_mnenja_ucite ljev_2018.pdf

P. Jančič Hegediš, U. Doberšek, M. Mithans: Tasks Oriented Towards the Use of Operational–Practical Methods in Textbooks for Environmental Studies

243

Filipčič, V. (2016). Učbeniški skladi, cene in kompleti učnih gradiv. *Vzgoja in izobraževanje: revija za teoretična in praktična vprašanja vzgojno izobraževalnega dela, 47*(1), 33–46.

Grošelj, N., & Ribič, M. (2013). *Lili in Bine 2. Učbenik za spoznavanje okolja v drugem razredu osnovne šole.* Rokus Klett.

Grošelj, N., & Ribič, M. (2016). *Lili in Bine 3. Učbenik za spoznavanje okolja v tretjem razredu osnovne šole.* Rokus Klett.

Hadar, L. L. (2017). Opportunities to learn: Mathematics textbooks and students' achievements. *Studies in Educational Evaluation, 55*, 153–166. https://www.sciencedirect.com/science/article/abs/pii/S0191491X17300949

Hergan, I., Devetak, I., Kolar, M., & Kovač, T. (2014a). *Dotik okolja 3. Učbenik za spoznavanje okolja v tretjem razredu osnovne šole.* Mladinska knjiga.

Hergan, I., Kovač, T., & Rot Vrhovec, A. (2014b). *Dotik okolja 1. Učbenik za spoznavanje okolja v prvem razredu osnovne šole.* Mladinska knjiga.

Hergan, I., Rot Vrhovec, A., Kovač, T., & Battelli, C. (2015). *Dotik okolja 2. Učbenik za spoznavanje okolja v drugem razredu osnove šole.* Mladinska knjiga.

Herlinda, R. (2014). *The Use of Textbook in Teaching and Learning Process: A Case Study of Two EYL Teachers [Conference presentation].* TEFLIN International Conference. https://pdfs.semanticscholar.org/bbb2/76b93aa1dcfe4b5648a90ddf098b32cdb0e2.pdf

Hus, V., & Čagran, B. (2008). Didaktične značilnosti učbeniških kompletov za pouk spoznavanja okolja po oceni učiteljev. *Sodobna Pedagogika, 59*(4), 70–84. https://www.dlib.si/stream/URN:NBN:SI:doc-W4D3MWAD/b7a26b84-e4b4-448a-82a6-0aca04574353/PDF

Hus, V. (2013). How Teachers Evaluate the Environmental Studies Subject Textbook Sets. *Education and Science, 38*(167), 289–299. https://www.researchgate.net/publication/281105926_How_Teachers_Evaluate_the_Environmental_Studies_Subject_Textbook_Sets

Ivanuš Grmek, M., Čagran, B., & Sadek, L. (2009). *Eksperimentalna študija primera pri pouku spoznavanja okolja.* Pedagoški inštitut.

Jančič, P., & Hus, V. (2019). Representation of teaching strategies based on constructivism in social studies. *Int. J. Innovation and Learning, 25*(1), 64–77. https://www.researchgate.net/publication/330048759_Representation_of_teaching_strategies_based_on_constructivism_in_social_studies

Kovač, M., Kovač Šebart, M., Krek, J. Štefanc, D., & Vidmar, T. (2005). *Učbeniki in družba znanja.* Center za študij edukacijskih strategij, Pedagoška fakulteta, Univerza v Ljubljani.

Krnel, D., Pečar, M., Bajd, B., Ferbar, J., Antić Gaber, M., & Grgičević, D. (2015). *Okolje in jaz 1. Spoznavanje okolja za 1.razred osnovne šole. 1. del.* Modrijan.

Krnel, D., Pečar, M., Bajd, B., Ferbar, J., Antić Gaber, M., & Grgičević, D. (2016). *Okolje in jaz 2. Spoznavanje okolja za 2. razred osnovne šole.* Modrijan.

Krnel, D., Pečar, M., Bajd, B., Ferbar, J., Antić Gaber, M., & Grgičević, D. (2017). *Okolje in jaz 1. Spoznavanje okolja za 1. razred osnovne šole. 2. del.* Modrijan.

Krnel, D., Bajd, B., Pečar, M., Ferbar, J., Antić Gaber, M., & Grgičević, D. (2018). *Okolje in jaz 3. Spoznavanje okolja za 3. razred osnovne šole.* Modrijan.

Letina, A. (2016). Strategije aktivnog učenja u nastavi prirode I društva. *Školski vjesnik: časopis za pedagogijsku teoriju i praksu, 65*(1), 1–31. https://hrcak.srce.hr/177318

Mithans, M., Zurc, J., & Ivanuš Grmek, M. (2023). Perceptions of didactic strategies among students and teachers in primary school. *Center for Educational Policy Studies Journal, 2023: Recently Accepted Papers.* https://doi.org/10.26529/cepsj.1491

Poljak, V. (1983). *Didaktično oblikovanje učbenikov in priročnikov.* DZS.

Primary school programme environmental studies. Curriculum [Program osnovna šola: Spoznavanje okolja: učni načrt]. (2011). Ministrstvo za šolstvo in šport. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_spoznavanje_okolja_pop.pdf

Remillard, J. T. (2005). Examining key concepts in research on teachers' use of mathematics curricula. *Review of Educational Research, 75*(2), 211–246. https://journals.sagepub.com/doi/pdf/10.3102/00346543075002211

Skribe Dimec, D., Umek, M., Vrščaj, D., Gostinčar Blagotinšek, A. & Čonč, V. (2012). *Raziskujem in razmišljam. Delovni učbenik za spoznavanje okolja v 1. razredu.* DZS.

Skribe Dimec, D., Umek, M., Vrščaj, D., Gostinčar Blagotinšek, A., Čonč, V., & Verbič Šalamon, T. (2013). *Raziskujem in razmišljam 2. Učbenik za spoznavanje okolja v 2. razredu osnovne šole.* DZS.

Strmčnik, F. (2001). *Didaktika: osrednje teoretične teme.* Znanstveni inštitut Filozofske fakultete.

Swanepoel, S. (2010). *The assessment of the quality of science education textbooks: Conceptual framework and instruments for analysis.* University of South Africa.

Šefer, N., & Kumše, V. (2015). *Lili in Bine 1. Učbenik za spoznavanje okolja v prvem razredu osnovne šole.* Rokus Klett.

Štefanc, D. (2005). Učbenik z vidika didaktične teorije: značilnosti, funkcije, kakovost in problematika potrjevanja. *Sodobna pedagogika 56*(4). 172-185.

Textbook Validation Regulations [Pravilnik o potrjevanju učbenikov] (2015). *Uradni list RS,* št. 34/2015, 27/2017. http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV12484

Tomić, A. (2003). *Izbrana poglavja iz didaktike.* Filozofska fakulteta, Center za pedagoško izobraževanje.

Turk Škraba, M. (2006). Učbenik kot prvina učnega procesa. *Vzgoja in izobraževanje: revija za teoretična in praktična vprašanja vzgojno izobraževalnega dela, 37*(5), 31-34.

Umek, M., Gostinčar Blagotinšek, A., Čonč, V., Ličan Adamčič, Ž., & Galonja, T. (2014). *Raziskujem in razmišljam 3. Učbenik za spoznavanje okolja v 3. razredu osnovne šole.* DZS.

Valenčič Zuljan, M., & Kalin, J. (2020). *Učne metode in razvoj učiteljeve metodične kompetence.* Pedagoška fakultete Univerze v Ljubljani.

Zavod Republike Slovenije za šolstvo [Institute of the Republic of Slovenia for Education] (2022). *Priporočila za izbiro učbenikov in kompletov učnih gradiv za šolsko leto 2022/2023* [*Recommendations for the selection of textbooks and sets of teaching materials for the school year 2022/2023*]. https://www.zrss.si/wp-content/uploads/2022/03/2022-03-17-Priporocila-za-izbiro-ucbenikov-in-kompletov-ucnih-gradiv-za-solsko-leto.pdf

Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

Mojca Oprčkal,[1] Vesna Hriberšek,[2] Nika Golob[1]

[1] University of Maribor, Faculty of Education, Maribor, Slovenia
mojca.oprckal1@um.si, nika.golob@um.si
[2] University of Maribor, Faculty of Natural sciences and Mathematics, Maribor, Slovenia
vesna.hribersek@student.um.si

Research shows that virtual reality holds significant potential to help students improve their skills and knowledge. In our investigation, we systematically examined possible applications for teaching chemistry using the Meta Oculus Quest 2 glasses based on selected criteria (cost, content, possibility of conducting virtual experiments, added value of VR technology). This was followed by a case study in which we tested the most suitable application, *The VR Chemistry Lab*, with six students from a general secondary school. The results showed students had a stronger interest in learning chemistry through the VR and revealed their awkwardness while working in the virtual lab, which calls for manual skills and techniques considerably different from work in a real lab. In the discussion, the urgent need for a more comprehensive approach to developing applications for virtual chemistry labs for teaching is stressed, for which collaboration between computer experts, chemists and chemistry educators is essential.

University of Maribor Press

Sistematični pregled in preizkus kemijske izobraževalne aplikacije za virtualno resničnost z VR očali Meta Oculus Quest 2

Mojca Oprčkal,[1] Vesna Hriberšek,[2] Nika Golob[1]

[1] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
mojca.oprckal1@um.si, nika.golob@um.si
[2] Univerza v Mariboru, Fakulteta za naravoslovje in matematiko, Maribor, Slovenija
vesna.hribersek@student.um.si

Raziskave kažejo, da ima virtualna resničnost velik potencial kot pomoč učencem pri izboljšanju njihovih veščin in znanja. Pri raziskovanju smo sistematično pregledali možne aplikacije za poučevanje kemije z očali Meta Oculus Quest 2 po izbranih kriterijih (strošek, vsebina, možnost izvajanja virtualnega eksperimenta, dodana vrednost VR tehnologije). Sledila je študija primera, pri kateri smo preizkusili izbrano najprimernejšo aplikacijo The VR Chemistry Lab s šestimi dijaki splošne gimnazije. Rezultati so pokazali večje zanimanje dijakov za učenje kemije z VR in njihovo nespretnost pri virtualnem laboratorijskem delu, ki je v ročnih spretnostih in tehnikah bistveno drugačno od realnega laboratorijskega dela. V diskusiji izpostavljamo nujno potrebo po celovitejšem pristopu pri razvoju aplikacij virtualnih kemijskih laboratorijih, namenjenih izobraževanju, kjer je poleg računalniških strokovnjakov potrebno sodelovanje kemijskih strokovnjakov in didaktikov kemije.

Univerzitetna založba
Univerze v Mariboru

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

247

1   Introduction

In recent decades, modern technologies have become an indispensable part of day-to-day lives. They have a substantial impact on our work, leisure time, social interactions, acquisition of information, and use of tools in both the workplace and education. The SARS-CoV-2 pandemic has also contributed to this, requiring the rapid adaptation of technologies for remote learning to maintain the normal learning schedule and achieve educational goals. Significant progress has been made in implementing innovative pedagogical approaches, providing an opportunity to explore innovative open educational platforms, practices and resources (Madhuri and Prakash Goteti, 2022). Education without modern technologies is nowadays practically unimaginable.

In today's education, 21st-century competencies, also known as soft skills, are vital. These include critical thinking and problem-solving, creativity and innovation, communication skills and collaboration abilities. To enable students to attain these competencies, they must be provided with an innovative learning environment that includes the use of ICT tools, the opportunity to create ICT content, and access to information. Systematic and appropriate use of ICT promotes greater flexibility, individualisation and personalisation (Štemberger et al., 2022). Ferk Savec (2015) emphasises the term "knowledge for teaching with ICT" – TPACK (Technological Pedagogical Content Knowledge), which describes the knowledge base needed for integrating technology into education (Ferk Savec, 2015). Learning and teaching in the digital society can be supported by artificial intelligence, learning analytics, mobile learning, microlearning, gamification, simulations (Bregar et al., 2020) and virtual reality, with the latter becoming ever more prevalent (Wijayanti and Ikhsan, 2019).

Virtual reality (VR) refers to a computer-generated simulation in which a person can move around in an artificial three-dimensional environment and interact with the help of special electronic devices. In this simulated artificial environment, the user can explore the space around them, use objects, and perform various activities (Bregar et al., 2020). Users can manipulate computer-generated objects with devices such as haptic devices (Ardiny and Khanmirza, 2018), with one example being virtual reality (VR) glasses. Immersion in virtual space (IVR) is a central feature of the learning experience in VR (Bregar et al., 2020). We are also familiar with augmented

reality (AR) whereby computer-programmed information and elements are connected to the real world (Ardiny and Khanmirza, 2018).

One of the main goals of introducing VR technology in classrooms is to personalise and thereby add to the efficiency of the learning process. Teachers can create content tailored to individual needs, accommodate various cognitive levels, make specific adjustments, and provide feedback. VR can be effectively used as a teaching tool in various areas like interactive and collaborative learning, virtual classrooms, practical training, and virtual excursions (Bregar et al., 2020). Through virtual excursions, students can explore historical sites, distant places, museums, other countries, and different industrial processes, productions and factories that are otherwise inaccessible (Muz and Yüce, 2023). Teachers involved in a study (Yıldırım et al., 2020), whose purpose was to determine teachers' opinions on virtual reality after they had applied VR for 2 months in their classrooms, suggested the following aspects for integrating VR into the classroom: Review of the learning objectives and content for VR; adaptation of teaching activities; consideration of learning styles; preparation of students for VR; collaboration with experts; reflection on the technical challenges; and evaluation of the learning experience in VR.

A key advantage over conventional teaching methods is that VR allows users to experience content that would be difficult, if not impossible, to demonstrate or describe using traditional methods (Yoo and Brownlee, 2020). VR enables the viewing of 3D models, virtual manipulation of objects, and understanding of invisible phenomena (Ardiny and Khanmirza, 2018). Further, VR technology is useful in education for visualising complex spatial representations and enhancing understanding of abstract concepts, processes and phenomena related to the submicroscopic world. Research (Frevert and Fuccia, 2021) that assessed students' understanding of the chemical aspects of the coronavirus (SARS-CoV-2) as content using the VR application Nanome showed that VR helped students understand the structure and biochemical functionality of the coronavirus. Modern topics were linked in this way with technologies and the students' chemical knowledge and digital competencies were promoted. Interviews with the students revealed they felt motivated in the digital learning environments and had acquired more content knowledge (Frevert and Fuccia, 2021). Sarıoğlu and Girgin (2020, in Muz and Yüce, 2023) established that VR technology positively influences achievements and attitudes to science and technology subjects. Conducted between 2013 and 2022,

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

249

research indexed in SCOPUS, ERIC and Web of Science was analysed in a study by Muz and Yüce (2023) in terms of predefined criteria like publication year, research designs, target groups, field, data collection tool, data analysis method and main results. A review of 23 studies found that use of VR in education contributes to academic achievement, motivation, efficiency, sustained learning, attitude to teaching, positive thinking, critical thinking, and collaboration. The results also suggest that VR is more effective when used as an alternative teaching method compared to traditional teaching methods (Muz and Yüce, 2023).

Despite numerous advantages, the use of VR glasses in education brings some challenges. One of them is the lack of affordable hardware and the development of applications that are suitable for use. As this technology is still under development, technical issues arise, such as the need for powerful computers and appropriate equipment (Bregar et al., 2020). There are also limited resources and funds available to purchase and maintain VR equipment. Some research also mentions the restricted opportunities to integrate VR technology into the curriculum and conduct learning activities within a limited time frame (Yıldırım et al., 2020). Users of VR glasses may experience side effects such as nausea, dizziness, headache, eye fatigue (LaValle, 2020) and disorientation, typically caused by a mismatch between visual perception and the sense of movement (Ardiny and Khanmirza, 2018). Head-mounted displays (HMDs) are relatively heavy, potentially causing user fatigue over an extended period (Ardiny and Khanmirza, 2018).

1.1 Virtual reality in chemistry education

A notable benefit of using VR glasses in chemistry lessons is the ability to conduct laboratory experiments in a virtual environment, which enhances the hands-on learning experience. In addition, VR goggles enable visually appealing and realistic simulations of molecules, chemical reactions, and abstract concepts, thereby contributing to a better understanding and visualisation of chemistry (Oprčkal and Hriberšek, 2023). VR is particularly beneficial for chemistry and other sciences because it provides clear visual and spatial representations of complex concepts. The ability to visualise and concretise abstract concepts is an important advantage of teaching science in VR (Hu-Au and Okita, 2021). Sakamoto (2018) states that use of VR technology boosts interest and motivation for learning natural science subjects and can help with better understanding and visualisation of scientific concepts

(Sakamoto, 2018). In another study (Lu, Xu and Zhu, 2021), the focus was on the possibility of involving students with mobility impairments interested in experimental chemistry. Most chemistry experiments are inaccessible to students with mobility impairments, e.g., students in wheelchairs. With VR glasses and the use of chemistry applications, they can become accessible for them. Despite the advantages, experts note that currently there is a lack of suitable content aligned with the curriculum or suitable VR applications for chemistry lessons (Dinther et al., 2023).

Many schools lack adequate equipment for laboratory work, have expired chemicals or an inadequate laboratory inventory. This problem can be solved by technology – virtual labs (Suleman et al., 2019). A virtual laboratory is created to simulate real experiments. Students can perform or observe experiments. In virtual labs, the results are consistently the same, time is saved and there is access to a variety of simulated chemicals and equipment (Rizman Herga, 2015). The advantage of working in VR is safety, given that there is no possibility of chemical accidents, and lower long-term costs, as experiments can be repeated as many times as desired without using actual chemicals (Lu, Xu and Zhu, 2021). However, Rizman Herga (2015) points out a significant disadvantage: the lack of manual skills training, which students cannot develop in virtual labs. This means that while virtual labs cannot replace actual lab work, they can contribute to students' knowledge (Rizman Herga, 2015). Lewis et al. (2014, cited in Havlíčková et al., 2018) criticise virtual labs for inaccurately representing real samples and their superficiality. Disadvantages also include experimental results that are not always accurate or are presented superficially (Lu, Xu and Zhu, 2021).

2   Methodology

Research aims and problem

The aim of the study was to investigate possible applications for learning chemistry with the VR glasses Meta Oculus Quest 2 and to test the usability of the selected application for teaching chemistry.

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

251

We set two research questions:

Q1: Which applications are suitable for teaching chemistry in virtual reality with Meta Oculus Quest 2?

Q2: How useful is the most appropriate application for teaching chemistry? What are the advantages and disadvantages of this application?

2.1 Methodology

Between March and May 2023, we reviewed five potential chemistry teaching applications for VR goggles, specifically Meta Oculus Quest 2. We searched the Meta website (https://www.meta.com/experiences/) for keywords such as chemistry, education and virtual lab. Each application was then evaluated based on the following criteria: cost, content, possibility of conducting virtual experiments, and the added value of VR technology for students. Thus, we obtained data for the first research question Q1.

After the review, we selected the most suitable application *The VR Chemistry Lab* and in May 2023 tested it with students from a high school as a case study. The participants wore a VR headset and operated hand controllers. The students initially familiarised themselves with the VR equipment and basic use of the VR glasses, which we had introduced to them. After entering the virtual lab, they first familiarised themselves with the layout, inventory, and safety equipment. They subsequently performed a virtual experiment, which took them about 15 minutes (Figure 2). After the virtual experiment, they completed a student learning sheet, which may be found in the appendix.

We obtained the data for Q2 through observation, the completed student learning sheet (following the virtual experiment) and a discussion among observers, the teacher and students after the virtual experiment and the students' learning sheet had been completed. The course of the research is outlined in the research plan (Figure 1).
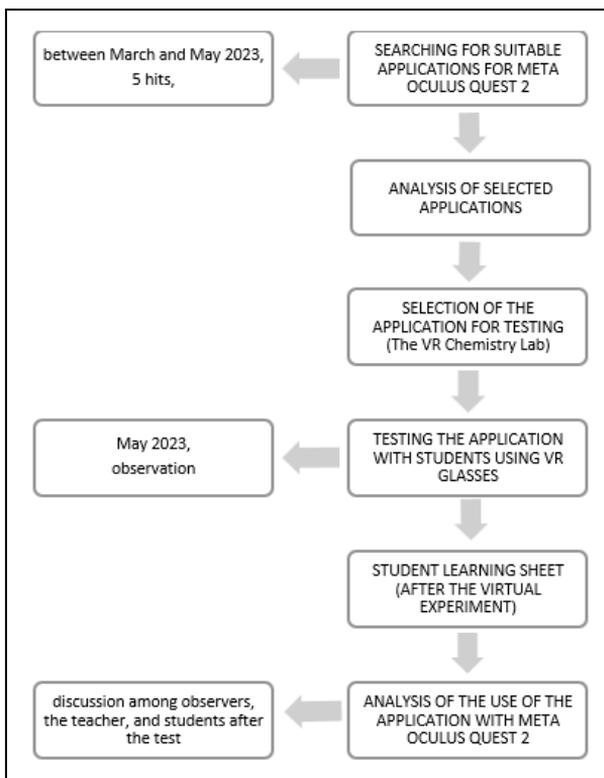
Figure 1: Research plan.
Source: own.

Figure 2: Conducting the virtual experiment with students.
Source: Mojca Oprčkal.

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

253

Sample

The participants (five female, one male) in our study were high school students (N = 6) in their first year of the gymnasium programme at the Third Grammar School in Maribor, Slovenia. Participants were students who were members of the chemistry club, which indicates they had greater skills and interest in chemistry. Their current grade point average in that school year was 4,0. We obtained the consent of the students to participate in the study.

We reviewed five applications with chemistry content available on the website www.meta.com. Together with the students, we tested one selected application, *The VR Chemistry Lab*, which is presented in the Results section.

Meta Oculus Quest 2 glasses

To conduct the virtual experiment, we used Meta Oculus Quest 2 VR glasses, as shown in Figure 2 above. To ensure a good fit and comfort, we also purchased the Oculus Quest 2 Elite strap. This ergonomic strap not only improves stability, but has a dial for tightening the ring, which contributes to extended use (Meta Quest 2, n.d.). Further, Oculus Quest 2 supports the use of VR glasses without a controller provided that the application supports this feature (Horvat, 2020). To use the goggles, one needs the Oculus Quest app on a smartphone, a Meta account to log into, and a good Internet connection. The wireless functionality of the VR glasses enables independent use for smaller and basic applications. Meta Quest glasses permit screen sharing in VR on a tablet, computer, phone or supported Chromecast device. We used this feature in our research to monitor the students during their virtual experiment and assist them when needed.

The VR Chemistry Lab application

The VR Chemistry Lab Simulation is a three-dimensional immersive representation of a conventional American school science laboratory (Hu-Au, et al., 2023). The virtual reality chemistry lab was created using Unity3D and replicates a physical lab classroom (Hu-Au and Okita, 2021). In the first practical session "Single Mixture Exercise", anhydrous copper(II) chloride had to be mixed with water and then a piece of aluminium foil had to be added to the aqueous solution. After the

experiment, students can also investigate the sub-molecular level of the reaction. This lab activity is recommended for middle to high school chemistry students (ages 11–18) by the American Association of Chemistry Teachers (AACT, 2020, cited in Hu-Au and Okita, 2021). It follows the 'cookbook' style for lab design and provides detailed procedural steps to be followed exactly (National Research Council, 2006, cited in Hu-Au and Okita, 2021). More information about the application can be found in Hu-Au and Okita (2021) and Hu-Au, et al. (2023).

3   Results

3.1   Applications for virtual reality in chemistry (RQ1)

Table 1 below presents five applications with chemical content meeting the criteria (cost, content, possibility of conducting virtual experiments, added value of VR technology) suitable for the 1st year of high school, gymnasium programme.

Table 1: Applications for use with Meta Oculus Quest 2

Application	Cost/ username	Content	Possibility of conducting virtual experiments	Added value of VR
Nanome	free	different molecular representations	No	+
Abelana's Atom Maker	EUR 9.99	building structure of 3D molecules, simulating an entire protein made of hundreds of atoms	No	++
The Big Table	EUR 2.99	Bohr diagram, atomic orbitals, energy levels, electron configurations	No	+
Cyber Dose	EUR 7.99	periodic table, subatomic particles, elemental properties	No	+
The VR Chemistry Lab	EUR 2.99	a sample's molecular structure, manufacture and usage effects, properties of substances	Yes	++

Legend:
+game, motivation
++ meaningful added value, submicroscopic view
+++ in connection with learning objectives, didactically and content-wise correct

M. Oprčkal, V. Hribernšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

255

We found that of the five applications, only one (*Nanome*) is freely accessible and only one (*The VR Chemistry Lab*) offers the possibility to perform a virtual experiment. In terms of content, two applications are suitable for the first year of high school: *The VR Chemistry Lab* and *Abelana's Atom Maker. The Abelana's Atom Maker* application could be used in the section on Particles (building blocks) of matter where students learn about orbitals and the arrangement of electrons in energy levels or orbitals in atoms and ions of representative elements (Chemistry Curriculum, 2008). *The VR Chemistry Lab* application, on the other hand, could be used in the Chemical Reaction as Substance and Energy Change section where students learn about energy changes in chemical reactions and distinguish the properties of reactants and products (Chemistry Curriculum, 2008). As an added value, we identified motivation through gamification and a submicroscopic perspective in all applications. Despite a small number of experiments and identifying some shortcomings before implementation, we found *The VR Chemistry Lab application* to be the most suitable for testing with first-year high school students among all of the applications reviewed.

3.2 The application The VR Chemistry Lab (RQ1)

The VR Chemistry Lab application includes multiple experiments. We selected the Chemical Reaction Lab experiment, which introduces the basics of chemical reactions. In the experiment, a reaction occurs between copper(II) chloride, water and aluminium foil. The sequence of the experiment in the virtual laboratory of the selected application is presented below (Table 2).

Table 2: Course of the virtual experiment
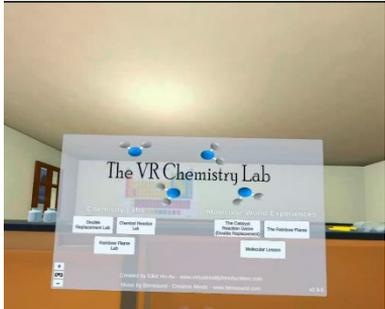
	In the virtual environment, you first select which experiment you would like to perform. In our case, we choose Chemical reaction.

	We first read the instructions for conducting the experiment. Then, following the instructions, we put on a protective coat, gloves and safety glasses.
	We weigh out 0.5 g of copper(II) chloride.
	We pour 30 mL of water into the beaker.
	We add the weighed copper(II) chloride to the beaker of water and stir so that it dissolves. We measure the temperature.
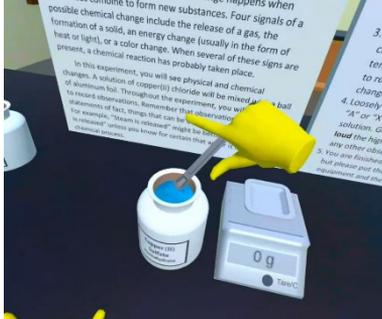
M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

257
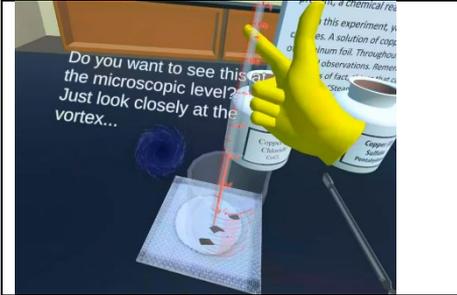
	We add crumpled aluminium foil.
	We observe the course of the reaction and make another temperature measurement.
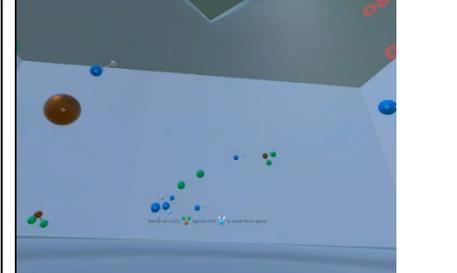
Source: Screenshots from the application The VR Chemistry Lab

Users can repeat the virtual experiment multiple times without consuming chemicals, as they would in a real lab. The application allows working with simulated chemicals that may be expensive or unavailable in a school lab. Since the experiment is conducted virtually, there is no risk of a hazardous situation with simulated chemicals during the experiment. Students can explore the submolecular level of chemicals. Mastering object manipulation in the virtual lab is crucial as objects can easily fall to the floor. Weighing and measuring becomes more challenging and requires precision with the controllers. Measurements of substances can be less accurate due to difficulties with reading scale numbers. The available inventory is limited. Some items such as waste containers for hazardous chemicals and glass stirring rods are missing. The application also has some technical inaccuracies, such as incorrect colours of chemicals and molecular representations. The application is also a paid service and the instructions are lengthy and written in English. It is not possible to write the results down on the worksheet displayed.

3.3 Results of the student learning sheet following the virtual experiment (RQ2)

After the virtual experiment, students were required to complete a learning sheet (see the appendix). The aim of evaluating the results was to assess the level of knowledge the students acquired through use of the virtual laboratory and VR

glasses. The worksheet comprised six tasks related to the experiment conducted in the virtual laboratory. In the first task, students had to list the laboratory inventory used during the experiment. All six students correctly identified the laboratory inventory. For the second task, students had to list the chemicals they had used. Three students correctly stated that they had used copper(II) chloride and aluminium in the experiment, while the other three mentioned having used only copper(II) chloride. The third task required students to write a well-organised chemical reaction. No student wrote a completely accurate chemical reaction that occurred during the experiment. Students struggled with expressing the aggregate states, chemical formulas, and appropriate coefficients. In the fourth task, students had to write the reactants and products of the chemical reaction. Three students correctly identified the reactants and products of the reaction. During the experiment, students could determine whether the reaction was exothermic or endothermic by measuring the temperature. Therefore, we included the determination of the reaction type and an explanation of why the reaction is exothermic or endothermic in the fourth task. Four students correctly stated that the reaction was exothermic, because heat had been released during the reaction. The sixth task involved a computational example related to the experiment. Based on the data about the quantity of copper(II) chloride and aluminium, students had to calculate how much copper was produced in the reaction. No student solved the task correctly. In most cases, students either wrote down the data or left the task incomplete.

3.4   Results of the observations, discussions among observers, the teacher and students after the test (learning and experimentation skills) (RQ2)

The students mostly focused on the use of VR technology and less on the content aspect of the experiment. They encountered difficulties with the controllers, which led to challenges with weighing, pouring, measuring and rearranging the inventory. Despite having the opportunity to repeat the experiment several times, they were unable to do so due to time constraints. The students needed around 15 minutes to carry out the virtual experiment. Beforehand, they familiarised themselves with the VR equipment and its use, which is essential before the first VR experience. After the experiment, they completed a learning sheet, which is also an important part of the experience to ensure that students retain the basics.

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

259

Observations revealed that they paid too little attention to chemical safety given the virtual environment. They spent more time exploring the submicroscopic view of the 3D reaction, which is often inaccessible to them. Both the teacher and the students agreed that the main purpose of the application was to enrich and motivate the lessons.

However, despite the interesting experience, the students expressed that they would prefer real laboratory experiments. They pointed out disadvantages such as controller issues, discomfort, headaches and awkward movements. Perceived advantages included the potential motivation, the opportunity to experiment with hazardous chemicals, and the submicroscopic view. Students thought the VR glasses were more suitable for a game. The chemistry teacher expressed the belief that with the current underdeveloped applications virtual reality (VR) technology does not hold great potential to replace real laboratories. The costs are also too high for schools, unless funding is available. The teacher emphasised that educators need to familiarise themselves with the equipment and its use before incorporating VR technology into lessons. In terms of potential applications in chemistry, the teacher envisages its use for submicroscopic visualisations, reactions, and the formation of chemical and molecular bonds. It could also be used in certain laboratory experiments, especially for enrichment and motivation.

4   Discussion

We may conclude from the small number of applications with chemical content which we found (just 5) that this area is not yet sufficiently developed. We had expected more suitable applications, since virtual labs, albeit not designed for VR glasses, have been available for some time (Rizman Herga, 2015). The available applications are not suitable for use in the classroom since they are not aligned with the curriculum, as also discussed by Dinther et al. (2023). They are chiefly intended for play and motivation. It would be necessary to refine them conceptually and didactically. For useful and meaningful applications with chemical content for primary and secondary schools, it is crucial to involve experienced educationalists, chemists and computer scientists.

During the implementation itself, we encountered challenges with the technical equipment and Internet connection, which had to be strengthened before the application could function. Due to the initial exposure and problems with using the VR technology, students did not achieve as much substantive knowledge as indicated by their completed learning sheets. Ernawati and Ikhsan (2021) showed in their research that students who use a virtual laboratory can achieve higher cognitive achievements than students relying on conventional methods. In the research, no significant progress in knowledge can be expected as users were more focused on the technical execution, which is different from the real-life experience. Only one student, who already had experience with computer games, showed a better mastery of VR technology. In order to use VR effectively, students need more experience with handling the controllers so that they can focus on the content and acquire pedagogical and experimental skills. However, the teacher's in-depth knowledge of using VR technology is essential for teaching students how to use the VR glasses. Yıldırım et al. (2020) stresses the need for training in the use of this technology and suggests the steps mentioned in the Introduction section. Despite this, it is felt that students do not gain as many lab skills and as much knowledge as they would with real experiments. Rizman Herga (2015) also mentions a substantial disadvantage, emphasising the lack of manual skills training, which students cannot develop in a virtual lab. In this virtual lab, students learn basic lab techniques (weighing, measuring, mixing) but do not develop real manual skills. A limitation is the lack of multisensory learning because factors like odours, temperatures and the true colours of substances are not captured. Before implementation, it was known that the colour of the mixture was irregular, yet no student noticed this during the experiment, which is a significant problem in the real world. Due to the virtual environment, the students were not attentive enough in terms of safety, which led to a decrease in awareness and a sense of dealing with dangerous chemicals. In contrast, one advantage is the absence of potential hazards (VR), as also mentioned in the study by Ernawati and Ikhsan (2021). The use of VR glasses currently represents a considerable financial investment for schools, which is also mentioned by Muz and Yüce (2023) after reviewing 23 research studies. Namely, not all students were able to carry out the experiment at the same time. Both the students and the teacher agreed that the central purpose of the application was to enrich chemistry lessons. If the application is appropriate in terms of didactics and content, VR technology can be particularly useful while dealing with abstract submicroscopic content (Frevert and Fuccia, 2021). We believe the application used has the added benefit of

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

261

providing students with a submicroscopic visualisation in 3D, which would give them a basis for understanding the reaction. Still, it is not yet clear from the tested application whether the added value of a VR lab in a VR environment can adequately replace students' real experimental work.

5   Conclusion

Due to the limitations of our research and time constraints, we did not include an introductory application for the use of VR glasses. It would be useful to test the virtual experiment with students already familiar with VR technology as they could then focus solely on the content, not the technology. If repeated, we would involve students with different academic achievements in chemistry to see how VR technology affects their learning and experimental achievements. For further research, a comparison could be made between the knowledge gained by performing experiments traditionally (live) and performing the experiment in a virtual lab. It would be worth investigating the extent to which the use of a high-quality virtual laboratory provides other insights, such as: improved submicroscopic visualisation, whether the effect of possible repetitions with different amounts of reactants and different conditions is suitable for conclusions and syntheses etc., or even whether a combination of real and virtual experiments can be used in didactically meaningful adaptations. We wish for the development of virtual laboratories to move in the direction of a didactically meaningful, educationally valuable and accessible application. Before VR technology can be used in chemistry lessons, applications must be developed and their appropriate use well considered. To avoid mistakes, the development of applications suitable for teaching should undergo similar reviews as textbooks.

References

Ardiny, H. and Khanmirza, E. (2018). The Role of AR and VR Technologies in Education
Developments: Opportunities and Challenges. *6th RSI International Conference on Robotics and
Mechatronics (IcRoM)*, Tehran, Iran, 2018, pp. 482-487, doi: 10.1109/ICRoM.2018.8657615

Bregar, L., Zagmajster, M., and Radovan, M. (2020). E-izobraževanje za digitalno družbo. [E-
education for the digital society]. Ljubljana: Andragoški center Slovenije.

Chemistry Curriculum. (2008). Chemistry. [Electronic resource]: gimnazija: splošna gimnazija.
Ljubljana: Ministrstvo za šolstvo in šport: Zavod RS za šolstvo.

Dinther, R., Putter, L. and Pepin, B. (2023). Features of Immersive Virtual Reality to Support
Meaningful Chemistry Education. *Journal of Chemical Education*, *100* (4), 1537-1546. doi:
10.1021/acs.jchemed.2c01069

Ernawati, D., and Ikhsan, J. (2021). Fostering Students' Cognitive Achievement Through Employing
Virtual Reality Laboratory (VRL). *International Journal of Online and Biomedical Engineering
(iJOE)*, *17*(13), pp. 44–58. https://doi.org/10.3991/ijoe.v17i13.24529

Ferk Savec, V. (2015). Priložnosti in izzivi za učitelje kemije v informacijski dobi. [Opportunities and
Challenges for Chemistry Teachers in the Information Age]. V: Orel, M. Sodobni pristopi
poučevanja prihajajočih generacij. Polhov Gradec: *EduVision*, (pp. 833-847).
https://www.researchgate.net/publication/293803309_PRILOZNOSTI_IN_IZZIVI_ZA_
UCITELJE_KEMIJE_V_INFORMACIJSKI_DOBI_OPPORTUNITIES_AND_CHALA
NGES_FOR_CHEMISTRY_TEACHERS_IN_THE_INFORMATION_AGE

Frevert, M. and Fuccia, D. D. (2021). Possibilities of Learning Contemporary Chemistry via Virtual
Reality. *World Journal of Chemical Education*, *9*(1), 1-7. doi: 10.12691/wjce-9-1-1

Havlíčková, V., Šorgo, A. and Bílek, M. (2018). Can Virtual Dissection Replace Traditional Hands-on
Dissection in School Biology Laboratory Work?. *Eurasia Journal of Mathematics, Science and
Technology Education, 14*(4), 1415-1429. doi: 10.29333/ejmste/83679

Horvat, T. (2020). Recenzija VR očal Oculus Quest 2. [Review of Oculus Quest 2 VR Glasses]. *Phyte*.
https://pbyte.si/recenzija-vr-ocal-oculus-quest-2/

Hu-Au, E. and Okita, S. (2020). Comparing Learning Between Virtual Reality and Real-Life
Chemistry Labs. *Paper presented at the 2020 annual meeting of the American Educational Research
Association. Retrieved, from the AERA Online Paper Repository.*
https://www.aera.net/Publications/Online-Paper-Repository/AERA-Online-Paper-
Repository-Viewer/ID/1569708

Hu-Au, E. and Okita, S. (2021). Exploring Differences in Student Learning and Behavior Between
Real-life and Virtual Reality Chemistry Laboratories. *J Sci Educ Technol 30* (6), 862–876. doi:
10.1007/s10956-021-09925-0

Hu-Au, E. et al. (2023). Novel Behaviors of Youth in a Virtual Reality Chemistry Lab. In: Bourguet,
ML., Krüger, J.M., Pedrosa, D., Dengel, A., Peña-Rios, A., Richter, J. (eds) Immersive
Learning Research Network. iLRN 2023. *Communications in Computer and Information Science*, vol
1904. Springer, Cham. doi: 10.1007/978-3-031-47328-9_24

LaValle, S. M. (2020). Virtual reality. University of Oulu. http://lavalle.pl/vr/

Madhuri, J. V. and Prakash Goteti, L. N. S. (2022). Using virtual laboratories in Chemistry through
guided inquiry-based approach. *Journal of Positive School Psychology*. *Vol. 6*, No. 2, 369–374.
https://mail.journalppw.com/index.php/jpsp/article/view/1309/664

Meta Quest 2. (n.d.). *Meta*. https://www.meta.com/quest/products/quest-2/

Muz, İ. and Yüce, E. (2023). Virtual Reality (VR) in Education: The Case in Türkiye. Bartın
University Journal of Faculty of Education, *12*(3), 604-617.
https://dergipark.org.tr/en/pub/buefad/issue/77976/1285901

Oprčkal, M. and Hriberšek, V. (2023). Poročilo projekta AR_VR_Com_022_PEF_A1. [Project
Report AR_VR_Com_022_PEF_A1]

Rizman Herga, N. (2015). Kakovostno znanje naravoslovja s pomočjo virtualnega laboratorija v vlogi
elementa vizualizacije. [Enhancing the Quality of Science Education through Virtual

M. Oprčkal, V. Hriberšek, N. Golob: Systematic Review of Virtual Reality Applications for Teaching Chemistry Using Meta Oculus Quest 2 and Testing of a Selected Application

263

Laboratories as a Visualization Element]. [Doctoral Dissertation, University of Maribor]. Digital Library of the University of Maribor. https://dk.um.si/IzpisGradiva.php?lang=slv&id=48612

Sakamoto, M., Hori, M., Shinoda, T., Ishizu, T., Akino, T., Takei, A. and Ito, T. M. (2018). A Study on Applications for Scientific Experiments Using the VR Technology. *International Conference on Information and Communication Technology Robotics (ICT-ROBOT)*, Busan, Korea (South), pp. 1-4, doi: 10.1109/ICT-ROBOT.2018.8549868.

Suleman, M., Sugiyarto, K. H. and Ikhsan, J. (2019). Development of Media Three-dimensional (3D) Visualization using Virtual Reality on Chemistry Education. *Journal of Physics: Conference Series, Volume* 1397. doi: 10.1088/1742-6596/1397/1/012034

Štemberger, T., Čotar Konrad, S., Rutar, S. and Žakelj, A. (2022). Oblikovanje inovativnih učnih okolij. [Constructing innovative learning environments]. Založba Univerze na Primorskem, Koper. https://www.hippocampus.si/ISBN/978-961-293-139-1.pdf

Lu, Y., Xu, Y. and Zhu, X. (2021). Designing and Implementing VR²E²C, a Virtual Reality Remote Education for Experimental Chemistry System. *Journal of Chemical Education*, *98* (8), 2720-2725. doi: 10.1021/acs.jchemed.1c00439

Yıldırım, B., Sahin Topalcengiz, E., Arıkan, G. and Timur, S. (2020). Using Virtual Reality in the Classroom: Reflections of STEM Teachers on the Use of Teaching and Learning Tools. *Journal of Education in Science Environment and Health*, *6* (3), 231-245. doi: 10.21891/jeseh.711779

Yoo, J. and Brownlee, E. A. (2020). The Past, Present, and Future of Virtual Reality in Higher Education. In M. Okojie & T. Boulder (Eds.), *Handbook of Research on Adult Learning in Higher Education* (pp. 633-657). IGI Global. doi: 10.4018/978-1-7998-1306-4.ch024

Wijayanti, J. D. and Ikhsan, J. (2019). Virtual Reality Laboratory for Chemistry Education: The Effect of VR-Lab Media on Student's Cognitive Outcome. *The Science and Science Education International Seminar Proceedings*. http://seminar.uny.ac.id/sseis/sites/seminar.uny.ac.id.sseis/files/2019/C-2_J_D_Wijayanti.pdf

Appendices:

A.   Translation of the student learning sheet

Programme:
Class:
Final Grade in Chemistry:

 VR LABORATORY: CHEMICAL REACTION
(The VR Chemistry Lab)
1.   List the laboratory equipment you used during the experiment.

2.   List the chemicals you used during the experiment.

3.   Write down the balanced chemical reaction that occurred. Don't forget the states of matter.

4.   List the reactants and products of the reaction that occurred.

REACTANTS:
PRODUCTS:

5.   Is the reaction endothermic or exothermic? Explain.

6.   Computational problem related to the experiment.

In the experiment, you used 0.5 g of copper(II) chloride and 3 g of aluminium, which reacted with each other. Aluminium chloride and copper were formed. Calculate how many grams of copper are produced in the reaction.

Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

Andreja Špernjak, Janja Majer Kovačič
University of Maribor, Faculty of Natural Sciences and Mathematics, Maribor, Slovenia
andreja.spernjak@um.si, janja.majer@um.si

Practical work in the school environment as a teaching method has many advantages, as it is more efficient due to the permanence of knowledge. The performance of practical work by students facilitates and improves logical thinking, critical thinking, understanding of science, application of knowledge, interpretation of observations and definition of a new problem. The article describes the proven benefits of practical work in lower secondary school chemistry lessons and highlights teachers' views on doing practical work and teachers' views on students' perceptions of practical work. We also looked for possible statistically significant differences in the implementation of practical work in chemistry lessons according to teachers' gender, teaching profession and seniority. Despite the importance of practical work, in practice teachers often encounter the problems discussed in the study. According to our results, teachers carry out practical work to a large extent despite the obstacles. Because of the advantages of practical work, teachers would like to have smaller groups when carrying it out, more hours for carrying it out and the support of laboratory assistant, which is common in secondary school but not in lower secondary school.

University of Maribor Press

Izvedba praktičnega dela pri kemiji v slovenskih osnovnih šolah učinkovitejši pouk kemije

Andreja Špernjak, Janja Majer Kovačič

Univerza v Mariboru, Fakulteta za naravoslovje in matematiko, Maribor, Slovenija
andreja.spernjak@um.si, janja.majer@um.si

Praktično delo v šolskem prostoru ima veliko prednosti pred ostalimi metodami dela, saj je zaradi trajnosti znanja, učinkovitejše. Izvedba praktičnega dela učencev vpliva na lažje in boljše sklepanje, kritično mišljenje, razumevanje znanosti, uporabo znanja, razlage opažanj ter definiranje novega problema. V članku so zapisane dokazane prednosti praktičnega dela pri urah kemije v osnovni šoli, izpostavljeni pa so pogledi učiteljev na izvedbe praktičnega dela ter mnenje učiteljev o tem, kako učenci dojemajo praktično delo. Preverili smo tudi morebitne statistično značilne razlike o izvedbi praktičnega dela pri urah kemije glede na spol, pedagoški naziv in dobo službovanja med učitelji Kljub pomembnosti praktičnega dela, učitelji v praksi pogosto naletijo na težave, obravnavane v raziskavi. Glede na naše ugotovitve učitelji praktično delo, kljub oviram, izvajajo v veliki meri. Zaradi prednosti praktičnega dela bi si učitelji želeli manjše skupine pri izvedbi, več ur za izvedbo in pomoč laboranta, kar je v srednješolskem prostoru praksa, v osnovni šoli pa ne.

Univerzitetna založba
Univerze v Mariboru

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

267

1 Introduction

In Slovenian elementary school, scientific content is woven into various subjects in all nine school years. Chemistry is a subject in the 8th and 9th grade of lower secondary school. It is a fundamental natural and experimental science in which substances, their structure, properties and changes are examined. In lower secondary school, the focus of chemistry is primarily on the acquisition and development of basic chemical knowledge, skills, attitudes and attitudes. The general aims of the lessons are for students to develop an understanding of natural processes, a responsible attitude towards handling substances and an awareness of safety in the workplace. Special emphasis is placed on developing students' experimental and inquiry skills and abilities, exposure to scientific processes, creativity, cognitive processes and critical thinking that strengthen scientific literacy. The curriculum also includes the development of scientific and mathematical competencies that promote the development of complex and critical thinking. The competencies are developed by students through searching, processing and evaluating data, using specialised terminology in describing processes, laws and phenomena, and developing an experimental approach to research (Bačnik, 2011).

As we can see from the review of curriculum content and objectives, practical work is a necessary part of science education. During practical work, students train various skills and develop many scientific competences that are necessary for life (Špernjak and Šorgo, 2018). Once you go into practise, you can understand the content better (Lau et al., 2023). Almost 1200 published papers in relevant databases: Web of Science, Education Resources Information Center (ERIC) and Scopus, in the period from 1995 to 2020, enhance the importance of chemistry laboratory work in the classroom (Ferk Savec, and Mlinarec, 2021).

Practical work gives students the opportunity to come into direct contact with materials or data that they have acquired through their own work. The teacher can carry it out to confirm what is already known (by working according to precisely prescribed procedures), or involve students in formulating questions, planning research and producing works (Gmajner, 2012), thus developing higher cognitive levels. All knowledge and theories in science come from practical observations and experiments, so hands-on work is an important part of science/chemistry teaching (Jones et al., 2016). Experimental work is indispensable in chemistry lessons because

it combines several activities with different objectives (Ferk Savec, and Mlinarec, 2021).

Experts have described four types of learning in the laboratory:

> explain, explore, discover and problem solve. These are categorised by three descriptors: outcome achieved, process used, and outcome achieved (Mbajiorgu and Reid, 2006). In particular, the explanatory and problem-solving laboratory methods use a deductive approach, while the exploratory and discovery learning methods use an inductive approach. One method that students often use when learning in the lab is the expository method (Copriady, 2015; Domin, 1999). Due to the lack of time for student laboratory work (Seid et al., 2022), teachers often use demonstrations, which are also hands-on work, but students are deprived of developing many skills.

The importance of practical work in the classroom

Practical work in the context of activities gives students experience of independent work. Practical work allows students to participate in activities related to science, but also to observe, reflect, develop ideas and develop skills (Oezdemir et al., 2011). According to Šorgo (2005), practical work is irreplaceable for science education. He believes that through practical work one can achieve an understanding of many processes and many goals that are more difficult or impossible to achieve with other working methods. The experience of the pandemic underlines the perceived importance of practical work in science education (Lau et al., 2023). Practical work requires more sensorimotor involvement from students than listening (Šorgo, 2005), so practical work can be more effective in terms of knowledge sustainability compared to other forms of work. In practical work, which takes place on an individual basis, interaction between teacher and student is also more frequent (Šorgo, 2007).

Practical work impacts on reasoning, critical thinking, understanding of science, development of skills and manual dexterity and enables students to apply knowledge, define a new problem, explain observations and make decisions. Students can actively participate, observe and evaluate the results of practical work, which makes learning permanent (Kolçak et al., 2014).

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

269

Integrative refers to the integration of theory in the classroom and practical application in the laboratory; efficient and practical indicates that the practicality of economic and simple practice; training skills include practical skills, transferable skills and intellectual stimulation (Anwar et al., 2024). Practical work also enables the student to learn about different concepts such as theoretical models, hypotheses and taxonomic categories. Cognitive skills such as problem solving, analysis, synthesis, application and critical thinking are an important goal that students can achieve through practical work. Through hands-on work, students also gain an understanding of the nature of science, such as the work of a researcher, the connection between science and technology, scientific wonder, and the existence of different scientific methods. An important goal is also to adopt attitudes such as objectivity, curiosity, accuracy, risk acceptance, doubt, satisfaction, consensus, collaboration, responsibility and enjoyment of scientific work (Šorgo, 2005). Practical work in the scientific subjects is also important because it promotes creativity. With the help of practical work, the student can develop self-confidence, the ability to work according to instructions and memorise facts and principles more easily (Šorgo, 2007a). Teachers should be aware of the benefits of practical work for students. Although we can see from the comments of teachers from our research that they see benefits in practical work, the challenges and problems are obviously so great that they outweigh the benefits. Based on the facts:

- that practical work is necessary for the development of understanding of scientific concepts and explanations (Toninato and Santovito, 2015)
- that practical work enables students to better connect theory with practice and thereby also acquire life skills (Šorgo, 2005);
- that learning is more sustainable through student activity (Kolçak et al., 2014);
- that methods in which students are active and independent increase students' interest in scientific content (Itzek-Greulich et al., 2017)
- that students develop many practical skills during hands-on work (Jones et al., 2016) and that practical work should be carried out in such a way that the students acquire skills and competencies for their future lives to the greatest extent possible.
- When a student's achieves something on their own, completes a certain task, they feel satisfied. Students' interest in science subjects is greater in subjects

that are related to everyday life and involve a lot of practical work (Itzek-Greulich et al., 2017).

Laboratory work - practical work is crucial in science / chemistry education, but teachers still encounter problems in practise. One of the main problems is that schools do not have sufficient equipment; the teacher needs more time to conduct lessons using experimental methods; students waste time collecting data; teachers' concern to fulfil the goals of the subject from the curriculum. School laboratories usually do not have the necessary equipment, so teachers either do not conduct experiments or the experiments are performed as demonstrations in class. Since teachers often do not receive enough information and skills during their training, they do not even bother to conduct experiments, especially when they encounter inadequately equipped laboratories (Kolçak et al., 2014).

Despite the proven importance of laboratory work in basic education, teachers are not unanimous the usefulness of practical work in the educational process. Some do not see the pedagogical benefits of practical work. On the other hand, there are many who see practical work as necessary. Practical work should be a puzzle and not the land of the already known (Lagowski, 2005).

Practical work in chemistry

Previous studies have reported that teachers perceive the inclusion of a list of recommended experiments for science lessons as positive (Gudyanga and Jita, 2019). Seid et al. (2022) surveyed teachers on factors that impact the practice of working in the chemistry lab. Teachers reported lack of resources (62%), lack of student interest in lab work (42.6%), lack of time for lab work (40.3%), lack of student participation in lab activities (36.6%), and that grading of lab reports is not encouraging (36.1%). When asked what problems they face when conducting laboratory work, most teachers agreed that it is difficult to conduct experiments in a context where there are not enough resources available. Considering the importance of practical work in chemistry lessons, it would be good to know the picture in Slovenian schools.
The aim of the research was to determine:

(i)   How Slovenian chemistry teachers perceive students' experiences of practical work

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

271

(ii)   Teachers' views on the implementation and purpose of practical work in lower secondary school chemistry and

(iii)   whether teachers' implementation of practical work differs and is statistically significant due to demographic differences (gender, age, seniority, title, school location).

2   Methods

2.1   Questionnaire

For the study, we used a questionnaire consisting of three parts. The first part contains questions about practical work in chemistry classes (e.g. how often they do laboratory work, what form of laboratory work they usually use, whether they have a laboratory assistant. According to the official Slovenia website Državni portal za poslovne subjekte (https://spot.gov.si/sl/dejavnosti-in-poklici/poklici-in-strokovni-kadri/laborant-v-vzgoji-in-izobrazevanju/), laboratory assistant in education conducts laboratory exercises, assists the subject teacher in class and prepares laboratory exercises, prepares materials and other didactic aids for conducting exercises and conducts other forms of organized work with students.). The second part consists of general questions about practical work, in which the teachers surveyed indicate their level of agreement with each item (see results in Table 1). The last set contains demographic questions (gender, age group, number of years teaching the subject, title, other subjects taught).

2.2   Sample and sampling

We used the 1ka online survey (https://www.1ka.si/). We sent the survey by e-mail to all 781 Slovenian elementary school, of which 456 were mainstream schools and 325 were branch schools. The research sample included chemistry teachers. The survey was active from April 25 to July 25, 2021. The survey was anonymous, so it is impossible to determine who completed the survey. We only asked the teachers which region the school they teach in belongs to. We rely on the honesty of the teachers and believe that no one would fill out the same survey more than once. The questionnaire was fully answered by 98 respondents, which corresponds to about 21% of Slovenian chemistry teachers. Depending on:

- gender: 5 (5.10%) men and 92 (93.90%) women.
- we divided them into three categories according to age:
  a) 10 (10.20%) teachers between the ages of 24 and 35 participated,
  b) 44 (44.90%) teachers were between 36 and 50 years old,
  c) 44 (44.90%) of the respondents were older than 51 years.
- 11 (11.20%) of the respondents had no title, 16 (16.30%) had the title of mentor, 47 (48.00%) had the title of advisor, 19 (19.40%) had the title of councillor, and 5 (5.10%) of the respondents had the title of senior councillor.

Of the 98 respondents, 95 (96.90%) teachers teach 8th grade chemistry and 97 (99.00%) teach 9th grade chemistry.

When asked whether they have assistant to assist them with laboratory work, 60% of the teachers surveyed answered yes.

The participating teachers not only teach chemistry, but also other subjects.

2.3   Statistical analyses

A total of 98 chemistry teachers responded for the subject of. We processed the collected data with a descriptive analysis using the statistical programme IBM SPSS 26.0. The results are described and presented in the form of tables. We included frequencies and proportions of responses, mean values ($\bar{X}$) and standard deviations (SD) in the analysis. The reliability of the questionnaires was checked using the Cronbach's α value, which is 0.53 for the chemistry questionnaire, which is generally low but still sufficient for further data processing.

We used the Kruskal-Wallis Test to analyse the differences according to the teacher's job title and seniority. For a more detailed analysis between the groups, we also used the Chi-Square test. Differences with $p < 0.05$ were considered statistically significant.

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

273

3   Results

3.1   Comparison of teachers' opinions about the experience of students' practical work with the perception of the importance of teachers' practical work

We were interested in the teachers' opinions about the students' experiences with practical work. The teachers pointed out many advantages of practical work:

–   49 (50.00%) of the teachers surveyed thought that students experience practical work as positive, as the best part of chemistry lessons, that they enjoy it, that they love it, that they like it and want it, that they adore it, that they look forward to it, and that it also motivates them because they like to work, because they like to be active, because they like to participate, and above all, because they like to experiment, because they are interested in the practical work.

–   10 (10.20%) teachers believe that the students experience the practical work as motivation and incentive for the work.

–   that students experience practical work as instructive because it enables them to understand better, learn deeper, faster and easier and remember better, and at the same time practical work enables them to gain experience and develop skills, according to 7 (7.14%) of the respondents.

Teachers pointed out the content of practical work that needs special attention, namely 16 (16.3%) of teachers think that:

–   practical work provides students with entertainment and a break from regular academic work, practical work is fun for students, students think that practical work is not a lesson and they do not need to know the content of this work, most students do not understand the meaning of practical work and have problems reading the instructions, students learn a lot, but sometimes they start the work with fear and then soon realize that it is interesting, the students are very interested during the practical work, but in the next lesson they do not remember what they have done, the students are uninterested because they do not carry out experiments themselves and

do not get a real feeling for it, the students are very spoiled and accept the practical work worse and more superficially every year.

Six (6.12%) teachers believe that students experience practical work differently, they wrote:

– some are highly motivated, but there are more and more people for whom practical work is a great unnecessary effort; some find it exhausting, others enjoy it; individualistic students with better grades often have problems with working in groups; some like it, others enjoy it so much that they do silly things; most students enjoy experiments and look forward to them, but there are also some are afraid of matches, fire, unknown substances, most find it interesting and are well motivated, while others keep stay in the background.

Ten (10.20%) of the respondents did not answer the question on how the students experience the practical work according to the teachers.

Respondents also gave answers to the question on how they perceive the importance of practical work (advantages, weaknesses, challenges, problems, etc.). Eleven (11.22%) of the respondents did not answer the question, but 42 (42.86%) of the respondents mentioned the benefits of practical work:

– it is not just theory, it is an enrichment of the lesson; action, stimulation, activity, activation of the senses;
– deepening of theoretical content, linking theory and practice, students test theory on concrete examples or learn new material;
– good motivation;
– development of enjoyment of the subject and scientific skills; encouragement to learn chemistry;
– practical work makes chemistry interesting, familiar and exciting;
– more consolidated knowledge, students remember better and more easily; easier and better understanding of the material;

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

275

- there is no chemistry without experiments/practical experiments, because they are instructive, interesting for the students, they learn a lot through this work, acquire additional knowledge;
- students develop skills and practical abilities during experimental work
- students develop social skills, management skills, cooperation with others, precision, strengthening manual skills, developing a research approach;
- experiential learning: direct experience, the child physically feels the utensils, sees the substances, learns precision, order, cleaning;
- clarity of content;
- learning through research;
- development of critical thinking;
- greater student activity;
- linking abstract knowledge to everyday life;
- students learn to formulate hypotheses, observe, analyze, draw conclusions and predict outcomes, record results;
- loss of fear of experimentation.

Both advantages and disadvantages, challenges and problems of practical work were written down by 30 (30.61%) respondents. 15 (15.31%) respondents only wrote down the weaknesses, challenges and problems of practical work. Teachers mentioned the following disadvantages of practical work:

- practical work is time-consuming, a lot of time is invested;
- a lot of preparation is needed to ensure that everything goes well;
- some students benefit a lot from practical work, others less;
- some students do not take the practical work seriously, but see it as fun;
- everything depends on the school management
- equipping the classroom with a cupboard, lab;
- additional burden and stress for the teacher.

The teachers mentioned the following problems with practical work:

– practical work is underestimated and incorrectly assessed, as teachers usually assess the product - worksheet or report - and not the work in the laboratory;
– a (too) large group of students;
– a lab technician who is unprofessional, has no experience with hands-on work, cannot help, is shared by too many teachers, or does not exist at all;
– not enough lessons and an overcrowded curriculum;
– unsuitable classroom, inadequate equipment;
– lack of equipment, materials and chemicals;
– students have less and less developed manual skills;
– difficulties in handling glassware and chemicals and the resulting risk of injury;
– students are not yet able to link knowledge, so that additional explanations are required.

As far as practical work is concerned, teachers would like to see smaller groups of students and more chemistry lessons per week so that they can do more practical work. Around two thirds of the teachers surveyed are of the opinion that they would like to carry out more practical work than before.

Participants' views on points of laboratory work related to job title. The participants have marked their opinions with numerical values, where 1 means "I don't agree at all"; 2 – "I don't agree"; 3 – "I cannot answer"; 4 – "I agree"; 5 – "I totally agree". The results are shown in Table 1 and ordered by decreasing Pearson chi-square values (χ^2).

Table 1: Respondents' opinions on the written items about the job title ˝chemistry teacher˝.

items	career title*	frequency (N) and the answers percentages [%]					$\bar{X}$	SD	χ^2	p
		1	2	3	4	5				
The Slovenian workbooks are not sufficiently equipped with laboratory and experimental content.	A	3 (27.30)	2 (18.20)	1 (9.10)	2 (18.20)	3 (27.30)	3.00	1.67	9.91	0.04
	B	1 (6.30)	3 (18.80)	4 (25.00)	3 (18.80)	5 (31.30)	3.50	1.32		
	C	9 (19.10)	15 (31.90)	13 (27.70)	6 (12.80)	4 (8.50)	2.60	1.19		
	D	4 (21.10)	7 (36.80)	5 (26.30)	3 (15.80)	0 (0.00)	2.37	1.01		
	E	0 (0.00)	0 (0.00)	3 (60.00)	1 (20.00)	1 (20.00)	3.60	0.89		
Slovenian textbooks are not sufficiently backed up with laboratory and experimental content.	A	3 (27.30)	1 (9.10)	4 (36.40)	1 (9.10)	2 (18.20)	2.82	1.47	9.75	0.05
	B	0 (0.00)	2 (12.50)	5 (31.30)	4 (25.00)	5 (31.30)	3.75	1.07		
	C	9 (19.10)	16 (34.00)	6 (12.80)	12 (25.50)	4 (8.50)	2.70	1.28		
	D	5 (26.30)	2 (10.50)	8 (42.10)	4 (21.10)	0 (0.00)	2.58	1.12		
	E	0 (0.00)	0 (0.00)	4 (80.00)	0 (0.00)	1 (20.00)	3.40	0.89		
I am satisfied with the range of chemicals available at school.	A	0 (0.00)	5 (45.50)	0 (0.00)	4 (36.40)	2 (18.20)	3.27	1.27	8.76	0.07
	B	2 (12.50)	2 (12.50)	4 (25.00)	7 (43.80)	1 (6.30)	3.19	1.17		
	C	2 (4.30)	4 (8.50)	4 (8.50)	21 (44.70)	16 (34.00)	3.96	1.08		
	D	0 (0.00)	2 (10.50)	5 (26.30)	9 (47.40)	3 (15.80)	3.68	0.89		
	E	0 (0.00)	1 (20.00)	0 (0.00)	2 (40.00)	2 (40.00)	4.00	1.23		

items	career title*	frequency (N) and the answers percentages [%]					$\overline{X}$	SD	χ^2	p
		1	2	3	4	5				
I am satisfied with the protective equipment needed in the school to carry out practical work.	A	0 (0.00)	2 (18.20)	2 (18.20)	2 (18.20)	5 (45.50)	3.91	1.22	8.03	0.09
	B	0 (0.00)	5 (31.30)	7 (43.80)	3 (18.80)	1 (6.30)	3.00	0.89		
	C	2 (4.30)	8 (17.00)	10 (21.30)	16 (34.00)	11 (23.40)	3.55	1.16		
	D	0 (0.00)	3 (15.80)	4 (21.10)	7 (36.80)	5 (26.30)	3.74	1.05		
	E	0 (0.00)	3 (60.00)	0 (0.00)	2 (40.00)	0 (0.00)	2.80	1.10		
The organized training (working groups. seminars, etc.) helps me to carry out my practical work competently.	A	1 (9.10)	0 (0.00)	3 (27.30)	3 (27.30)	4 (36.40)	3.82	1.25	6.82	0.15
	B	2 (12.50)	3 (18.80)	6 (37.50)	3 (18.80)	2 (12.50)	3.00	1.21		
	C	1 (2.10)	3 (6.40)	10 (21.30)	25 (53.20)	8 (17.00)	3.74	0.97		
	D	0 (0.00)	2 (10.50)	5 (26.30)	9 (47.40)	3 (15.80)	3.68	0.89		
	E	0 (0.00)	1 (20.00)	0 (0.00)	4 (80.00)	0 (0.00)	3.60	0.89		
Slovenian manuals for teachers are insufficiently supported by laboratory and experimental content.	A	0 (0.00)	3 (27.30)	3 (27.30)	3 (27.30)	2 (18.20)	3.36	1.12	6.07	0.19
	B	0 (0.00)	3 (18.80)	4 (25.00)	4 (25.00)	5 (31.30)	3.69	1.14		
	C	5 (10.60)	13 (27.70)	13 (27.70)	11 (23.40)	5 (10.60)	2.96	1.18		
	D	4 (21.10)	2 (10.50)	7 (36.80)	4 (21.10)	2 (10.50)	2.89	1.29		
	E	0 (0.00)	0 (0.00)	2 (40.00)	3 (60.00)	0 (0.00)	3.60	0.55		
A lesson with practical work as the leading teaching method takes too much time.	A	2 (18.20)	3 (27.30)	2 (18.20)	1 (9.10)	3 (27.30)	3.00	1.55	5.70	0.22
	B	2 (12.50)	3 (18.80)	4 (25.00)	2 (12.50)	5 (31.30)	3.31	1.45		
	C	5 (10.60)	11 (23.40)	4 (8.50)	16 (34.00)	11 (23.40)	3.36	1.36		
	D	4 (21.10)	6 (31.60)	4 (21.10)	3 (15.80)	2 (10.50)	2.63	1.30		
	E	0 (0.00)	0 (0.00)	1 (20.00)	3 (60.00)	1 (20.00)	4.00	0.71		
I feel confident enough to carry out the practical work in class successfully.	A	0 (0.00)	0 (0.00)	2 (18.20)	4 (36.40)	5 (45.50)	4.27	0.79	5.60	0.23
	B	0 (0.00)	0 (0.00)	2 (12.50)	6 (37.50)	8 (50.00)	4.38	0.72		
	C	1 (2.10)	1 (2.10)	0 (0.00)	16 (34.00)	29 (61.70)	4.51	0.80		
	D	2 (10.60)	0 (0.00)	0 (0.00)	7 (36.80)	10 (52.60)	4.16	1.39		

items	career title*	frequency (N) and the answers percentages [%]					$\overline{X}$	SD	χ^2	p
		1	2	3	4	5				
	E	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	5 (100.00)	5.00	0.00		
The lab assistant makes it easier for me to carry out the practical work.	A	0 (0.00)	5 (45.50)	2 (18.20)	0 (0.00)	4 (36.40)	3.27	1.42	5.12	0.28
	B	3 (18.80)	1 (6.30)	2 (12.50)	5 (31.30)	5 (31.30)	3.50	1.51		
	C	13 (27.70)	5 (10.60)	9 (19.10)	9 (19.10)	11 (23.40)	2.98	1.58		
	D	1 (5.30)	1 (5.30)	5 (26.30)	5 (26.30)	7 (36.80)	3.84	1.17		
	E	1 (20.00)	0 (0.00)	1 (20.00)	0 (0.00)	3 (60.00)	3.80	1.79		
I do not feel confident enough to do the practical work remotely.	A	3 (27.30)	3 (27.30)	4 (36.40)	0 (0.00)	1 (9.10)	2.36	1.21	5.10	0.28
	B	3 (18.80)	4 (25.00)	4 (25.00)	4 (25.00)	1 (6.30)	2.75	1.24		
	C	12 (25.50)	13 (27.70)	12 (25.50)	7 (14.90)	3 (6.40)	2.49	1.21		
	D	7 (36.80)	5 (26.30)	5 (26.30)	2 (10.50)	0 (0.00)	2.11	1.05		
	E	2 (40.00)	3 (60.00)	0 (0.00)	0 (0.00)	0 (0.00)	1.60	0.55		
The syllabus is too extensive in terms of content/objectives for practical work.	A	1 (9.10)	1 (9.10)	3 (27.30)	3 (27.30)	3 (27.30)	3.55	1.29	4.92	0.30
	B	2 (12.50)	0 (0.00)	3 (18.80)	5 (31.30)	6 (37.50)	3.81	1.33		
	C	0 (0.00)	8 (17.00)	8 (17.00)	17 (36.20)	14 (29.80)	3.79	1.06		
	D	2 (10.50)	3 (15.80)	7 (36.80)	4 (21.10)	3 (15.80)	3.16	1.21		
	E	0 (0.00)	0 (0.00)	1 (20.00)	3 (60.00)	1 (20.00)	4.00	0.71		
For the future. I would like to see more training on the implementation of practical remote work.	A	1 (9.10)	0 (0.00)	1 (9.10)	4 (36.40)	5 (45.50)	4.09	1.22	4.52	0.34
	B	0 (0.00)	0 (0.00)	3 (18.80)	6 (37.50)	7 (43.80)	4.25	0.78		
	C	2 (4.20)	1 (2.10)	12 (25.50)	19 (40.40)	13 (27.70)	3.83	1.07		
	D	1 (5.30)	0 (0.00)	6 (31.60)	9 (47.40)	3 (15.80)	3.68	0.95		
	E	0 (0.00)	0 (0.00)	1 (20.00)	3 (60.00)	1 (20.00)	4.00	0.71		
I am satisfied with the set of materials for practical work at school.	A	1 (9.10)	1 (9.10)	4 (36.40)	2 (18.20)	3 (27.30)	3.36	1.50	4.24	0.37
	B	1 (6.30)	1 (6.30)	7 (43.80)	6 (37.50)	1 (6.30)	3.31	0.95		
	C	3 (6.40)	4 (8.50)	7 (14.90)	21 (44.70)	12 (25.50)	3.74	1.13		
	D	0 (0.00)	3 (15.80)	3 (15.80)	8 (42.10)	5 (26.30)	3.79	1.03		
	E	1 (20.00)	0 (0.00)	1 (20.00)	3 (60.00)	0 (0.00)	3.20	1.30		
The curriculum for Chemistry 8th and 9th	A	2 (18.20)	2 (18.20)	3 (27.30)	2 (18.20)	2 (18.20)	2.91	1.58	4.22	0.38
	B	3 (18.80)	0 (0.00)	2 (12.50)	3 (18.80)	8 (50.00)	3.81	1.56		

items	career title*	frequency (N) and the answers percentages [%]					$\overline{X}$	SD	χ^2	P
		1	2	3	4	5				
grades should be updated.	C	1 (2.10)	7 (14.90)	15 (31.90)	12 (25.50)	12 (25.50)	3.57	1.10		
	D	1 (5.30)	1 (5.30)	8 (42.10)	4 (21.10)	5 (26.30)	3.58	1.12		
	E	0 (0.00)	0 (0.00)	1 (20.00)	3 (60.00)	1 (20.00)	4.00	0.71		
During my studies I was prepared to carry out practical work confidently in class.	A	0 (0.00)	2 (18.20)	2 (18.20)	4 (36.40)	3 (27.30)	3.73	1.10		
	B	2 (12.50)	1 (6.20)	7 (43.70)	3 (18.80)	3 (18.80)	3.25	1.24		
	C	5 (10.60)	11 (23.40)	10 (21.30)	12 (25.50)	9 (19.10)	3.17	1.34	3.24	0.52
	D	1 (5.30)	2 (10.50)	6 (31.60)	5 (26.30)	5 (26.30)	3.58	1.17		
	E	1 (20.00)	1 (20.00)	2 (40.00)	0 (0.00)	1 (20.00)	2.80	1.48		
It seems important to me that students carry out their practical work independently.	A	0 (0.00)	0 (0.00)	0 (0.00)	6 (54.50)	5 (45.50)	4.45	0.52		
	B	0 (0.00)	0 (0.00)	0 (0.00)	5 (31.30)	11 (68.80)	4.69	0.48		
	C	0 (0.00)	0 (0.00)	2 (4.30)	14 (29.80)	31 (66.00)	4.62	0.57	1.81	0.77
	D	0 (0.00)	0 (0.00)	1 (5.30)	7 (36.80)	11 (57.90)	4.53	0.61		
	E	0 (0.00)	0 (0.00)	0 (0.00)	2 (40.00)	3 (60.00)	4.60	0.55		
I think practical work in class is a waste of time.	A	8 (72.70)	2 (18.20)	1 (9.10)	0 (0.00)	0 (0.00)	1.36	0.67		
	B	11 (68.80)	3 (18.80)	1 (6.30)	1 (6.30)	0 (0.00)	1.50	0.89		
	C	37 (78.70)	9 (19.10)	0 (0.00)	1 (2.10)	0 (0.00)	1.26	0.57	1.71	0.79
	D	13 (68.40)	3 (15.80)	3 (15.80)	0 (0.00)	0 (0.00)	1.47	0.77		
	E	4 (80.00)	1 (20.00)	0 (0.00)	0 (0.00)	0 (0.00)	1.20	0.45		
A lesson with practical work as the leading teaching method takes too much time to prepare.	A	1 (9.10)	4 (36.40)	3 (27.30)	2 (18.20)	1 (9.10)	2.82	1.17		
	B	2 (12.50)	4 (25.00)	7 (43.80)	1 (6.30)	2 (12.50)	2.81	1.17		
	C	10 (21.30)	10 (21.30)	9 (19.10)	12 (25.50)	6 (12.80)	2.85	1.40	1.68	0.79
	D	6 (31.60)	5 (26.30)	3 (15.80)	3 (15.80)	2 (10.50)	2.47	1.40		
	E	1 (20.00)	1 (20.00)	3 (60.00)	0 (0.00)	0 (0.00)	2.40	0.89		
I update. add to or change at least one	A	0 (0.00)	0 (0.00)	3 (27.30)	5 (45.50)	3 (27.30)	4.00	0.76	1.12	0.89
	B	0 (0.00)	0 (0.00)	3 (18.80)	7 (43.80)	6 (37.50)	4.19	0.75		

items	career title*	frequency (N) and the answers percentages [%]					$\overline{X}$	SD	χ^2	p
		1	2	3	4	5				
practical exercise every few school years.	C	0 (0.00)	3 (6.40)	4 (8.50)	22 (46.80)	18 (38.30)	4.17	0.84		
	D	1 (5.30)	0 (0.00)	1 (5.30)	9 (47.40)	8 (42.10)	4.16	1.17		
	E	0 (0.00)	0 (0.00)	2 (40.00)	0 (0.00)	3 (60.00)	4.20	1.10		
Practical remote work is inefficient.	A	4 (36. 40)	2 (18.20)	2 (18.20)	2 (18.20)	1 (9.10)	2.45	1.44		
	B	1 (6.30)	6 (37.50)	6 (37.50)	2 (12.50)	1 (6.30)	2.75	1.00		
	C	12 (25.50)	10 (21.30)	13 (27.70)	10 (21.30)	2 (4.30)	2.57	1.21	1.11	0.89
	D	4 (21.10)	4 (21.10)	5 (26.30)	4 (21.10)	2 (10.50)	2.79	1.32		
	E	0 (0.00)	2 (40.00)	2 (40.00)	0 (0.00)	1 (20.00)	3.00	1.23		
In order to carry out practical work effectively. It would be good if there were more chem lessons in the 8th and 9th grades.	A	0 (0.00)	1 (9.10)	1 (9.10)	7 (63.60)	2 (18.20)	3.91	0.83		
	B	1 (6.30)	0 (0.00)	5 (31.30)	2 (12.50)	8 (50.00)	4.00	1.21		
	C	2 (4.30)	7 (14.90)	5 (10.60)	14 (29.80)	19 (40.40)	3.87	1.23	0.49	0.97
	D	1 (5.30)	2 (10.50)	3 (15.80)	6 (31.60)	7 (36.80)	3.84	1.21		
	E	0 (0.00)	0 (0.00)	3 (60.00)	0 (0.00)	2 (40.00)	3.80	1.10		

career title*: A: no title; B: mentor; C: counsellor; D: councillor; E: senior councillor

With a statistically significant difference ($\chi^2_{(1,2)} = 9.91$; $p = 0.04$), teachers without the title and the title of mentor are more likely to agree with the statement that Slovene workbooks are insufficiently supported by laboratory and experimental content than teachers with the title of counsellor, councillor and senior councillor (Table 1). For the other opinions, there are no statistically significant differences in terms of teachers' job titles.

No statistically significant differences in opinion were found in relation to teachers' seniority.

In an open question, the chemistry teachers named the areas of practical work that they would like to change. The question was answered by 72 (73.47%) respondents who wrote:

- small groups of students; less numerous departments;
- lab assistant; a good lab assistant; greater availability of lab assistants;
- classroom equipment required by law and a mandatory cabinet next to the classroom (so you do not have to carry chemicals across the hall); the ability to study in a chemistry classroom or lab; classroom equipment;
- more funds to buy chemicals; more chemicals and supplies, lab materials;
- more individual experiments by the students or conducting them in groups of two;
- more time;
- the seriousness of the students' work; the students' attitude towards practical work (some come with the already formed opinion that practical work is just fun); greater interest of the students;
- frequency of performance; more practical work; daily performance of experiments;
- standardization of minimum equipment by the ministry; more equipment;
- connection between experiment and theory;
- less learning content;
- more literature;
- less preparation and cleaning;
- nothing.

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

283

4   Discussion

In this study, we were interested in the implementation of practical work in chemistry at lower secondary school. With the help of the questionnaire, we received responses from about 21% of all Slovenian primary school chemistry teachers.

Based on the age groups of the teachers, we can see that more than 80% of the teachers are over 35 years old, and about half of them are over 51 years old. However, age is not a decisive factor for the implementation of chemistry practical, as more than 90% of the respondents stated that they carry out practical (iii). We can conclude that not much has changed in more than 15 years in terms of doing practical work, although much has been written about the importance of practical work, especially in science subjects. The latter is based on the theme of the importance of student activity during lessons to achieve higher levels of cognitive knowledge, manual skill development, independence, resourcefulness, group work and other benefits of practical work. The most common reason given by the teachers surveyed for not carrying out practical work more often is mainly lack of time and too large groups of students (ii). This suggests that it would be necessary to update the curriculum to allow for as much active learning and teaching as possible. A solution for too large groups of students could be found in organizing lessons in smaller groups of students, which would allow students and teachers to do more frequent practical work, as the teacher can only qualitatively supervise and guide a certain number of students during independent work. If splitting into smaller groups is not possible, a lab assistant or other professionally trained teacher would need to be employed to lead and supervise the second group. Although the laboratory assistant is included in the chemistry curriculum for lower secondary school as a mandatory part of the learning process (Bačnik, 2011; Vilhar, 2011), according to the results of our surveys, only 61 lower secondary school teachers (60%) employ a laboratory technician. Providing of the role of a laboratory technician to support practical work is a well-functioning practice in the secondary school system, so it would make sense to introduce it in lower secondary education as soon as possible.

The chemistry teachers surveyed in the study by Seid et al. (2022) stated that 40.3 % of teachers have too little time to carry out laboratory work in chemistry lessons. These results are consistent with our findings. Around two thirds of the teachers we surveyed stated that they would like to carry out more practical work than before.

As far as practical work is concerned, teachers would like smaller groups of students and more chemistry lessons per week so that they can do more practical work.

For many questions, we found no statistically significant differences between the opinions depending on the length of service of the teachers surveyed. There were statistically significant differences between the opinions of the teachers in relation to the job title of chemistry teacher (iii). Teachers without a title and with the title of mentor were more likely to agree with a statistically significant difference that the Slovene workbooks are not sufficiently supported by laboratory and experimental content than teachers with the title of advisor, councillors and senior councillors. It can be inferred from this that teacher with higher titles also obtain the content for practical work from other sources, while teachers with a lower title or no title would like to have more content for practical work in their workbooks, as this would make the work easier (iii). From the latter, the importance of professional experience can be deduced, from which the autonomy, independence and sovereignty of the teacher's work is derived. The researchers found that Slovenian chemistry teachers are not aware of all the skills that students can develop during experimental work. They are only aware of the content objectives, and there are deficits in the objectives related to experimental work and in the objectives related to broader scientific competences (Logar, 2016; Logar, Peklaj and Ferk Savec, 2017).

From the teachers' opinions we can conclude that the students like practical work in chemistry, that they mostly enjoy doing it and that it is interesting for them (i). However, this opinion is not shared by all students in the class, as some students do not actively participate in the work and do not take the work seriously (i). This makes the teachers' work considerably more difficult, as they disturb other students who would like to actively participate. For this reason, teachers' pay particular attention to disciplinary aspects when setting learning objectives.

The teachers in this study believe that practical work has many advantages (i), which is why they do it extensively. Mainly because of the weaknesses, challenges and problems of practical work that we have outlined in the theoretical and empirical work. Students can only achieve a higher level of knowledge through active working methods - active learning in practical work emphasises direct experience (Puhek et al., 2011). In order for students to develop a higher level of knowledge, the teacher should involve students in formulating questions, planning research and producing

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

285

work (Gmajner, 2012). Achieving a higher level of knowledge requires a fundamental shift towards methods and forms of work that require students to think actively and critically. Considering the results of this research that chemistry teachers mainly use Slovenian workbooks, the Internet and textbooks as a source for practical work and at the same time cite lack of time as a reason for the frequency of practical work, it would be necessary to create a kind of handbook/workbook that would make it easier for teachers to prepare students to actively carry out practical work. Examples of practical work in individual subjects would also be welcome as teachers feel that there are not many subjects that can be implemented practically. In order to increase the implementation of practical work, especially in the form of student activities, teachers would like to have a specialist laboratory assistant who is competent to help with the implementation of practical work and is available to them at all times (ii).

Teachers believe that society and the school system support theoretical content. They are convinced that students who learn theory (well) have priority at school, but not creative students and researchers. It would be easier for subject teachers to do practical work if students were already familiar with practical work at class level.

Limitations

The survey was conducted after the pandemic, when teachers were mainly working on computers, so they had no patience for another survey. However, the results suggest that lack of resources (e.g., lab equipment), lack of time to conduct lab work, and lack of commitment to lab activities are the main factors affecting the implementation of lab work. Perhaps now is the right time to get more time for lab work because the Slovenian curricula are being updated, so we could provide more time for students' lab work, which is crucial for chemistry practice. For future work, the use of traditional lab versus digital lab or augmented reality in the chemistry lab could be explored and which of these learning strategies has the most potential for students. Special attention should be paid to green chemistry (or sustainable chemistry is a concept in chemistry and chemical engineering that attempts to significantly reduce the consumption of hazardous substances and the resulting by-products in the development of products and processes (Mele Dužnik, 2019).) in experimental laboratory work and its implementation in Slovenian secondary and primary education.

Acknowledgments

References

Anwar, Y. A. S., Muti'ah M. and Dewi, Y. K. (2024). An integrated laboratory work to improve students' practical skills and attitudes toward biochemistry in the biochemistry course. *Biochem Mol Biol Educ.; 52:* 36–44.

Bačnik, A. (2011). Učni načrt. Program osnovna šola. Kemija. Ministrstvo za šolstvo in šport. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_kemija.pdf (retrieved: 3. 6. 2021)

Copriady J. (2015). Practical implementations of practical chemistry among secondary school teachers. *Asian Journal Sci Res., 8*(1): 22–40.

Državni portal za poslovne subjekte (https://spot.gov.si/sl/dejavnosti-in-poklici/poklici-in-strokovni-kadri/laborant-v-vzgoji-in-izobrazevanju/ (retrieved: 21. 4. 2024)

Ferk Savec, V.; Mlinarec, K. (2021). Experimental Work in Science Education from Green Chemistry Perspectives: A Systematic Literature Review Using PRISMA. *Sustainability, 13,* 12977. https://doi.org/10.3390/su132312977

Glažar, S. A. (2006). Eksperimentalno delo kot del poučevanja in učenja naravoslovja. In: I. Devetak, J. Strgar, and M. Naji (Ur.), Naravoslovje v teoriji in šolski praksi: pogledi in izkušnje (str. 121–129). Zavod Republike Slovenije za šolstvo.

Gmajner, L. (2012). Mnenje bodočih učiteljev biologije o praktičnem delu pri pouku biologije. http://pefprints.pef.uni-lj.si/1166/1/Diploma_Lea_Gmajner.PDF (retrieved: 1. 4. 2021)

Gudyanga, R., and Jita, L. (2019). Teachers' implementation of laboratory practicals in the South African physical sciences curriculum, *Issues in Educational Research*, 29(3), 715–731.

Ho, K., Smith, S.R., Venter, C., and Clark, D.B. (2021). Case study analysis of reflective essays by chemistry post-secondary students within a lab-based community service learning water project. *Chemistry Education Research and Practice*, 22: 973–84. https://doi.org/10.1039/D1RP00123J

Itzek-Greulich, H., Flunger, B., Vollmer, C., Nagengast, B., Rehm, M., and Trautwein, U. (2017). Effectiveness of lab-work learning environments in and out of school: A cluster randomized study. *Contemporary Educational Psychology*, 48, 98–115. https://doi.org/10.1016/j.cedpsych.2016.09.005 (retrieved: 16. 6. 2022)

Jones, A., Reed, R., and Weyers, J. (2016). Practical Skills in Biology (Sixth Edition). Pearson Education Limited.

Kolçak, D. Y., Moʄol, S., and Ünsal, Y. (2014). A Comparison of the Effects of Laboratory Method and Computer Simulations to Avoid Misconceptions in Physics Education. *Egitim ve Bilim*, 39(175), 154–171. https://doi.org/10.15390/EB.2014.2052 (retrieved: 16. 6. 2022)

Lagowski, J. J. (2005). A chemical laboratory in a digital world. Chemical Education International, 6(1). www.iupac.org/publications/cei (retrieved: 23. 10. 2022)

Lau, P. N, Teow, Y., Low X. T. T and Tan, S. T. B. (2023). Integrating chemistry laboratory–tutorial timetabling with instructional design and the impact on learner perceptions and outcomes. *Chemistry Education Research and Practice, 24*, 12. DOI: 10.1039/d2rp00055e.

Logar, A. Definition and evaluation of factors affecting the effectiveness of experimental work in the learning and teaching of chemistry, Ph. D. Thesis, Ljubljana, 2016. https://repozitorij.uni-lj.si/IzpisGradiva.php?id=87665

Logar, A., Peklaj, C., and Ferk Savec, V. (2017). Effectiveness of Student Learning during Experimental Work in Primary School. Acta Chim. Slov., 64, 661 – 671. DOI: 10.17344/acsi.2017.3544

Mbajiorgu N, and Reid N. Factors influencing curriculum development in chemistry. Hull: Royal Society of Chemistry; 2006.

A. Špernjak, J. Majer Kovačič: Implementation Of Practical Work in Chemistry in Slovenian Lower Secondary Schools: More Effective Chemistry Lessons

287

Mele Dužnik, M. Micro-scale and macro scale comparison of advantages and disadvantages of conducting chemical experiments, Master Thesis, Ljubljana, 2019. http://pefprints.pef.uni-lj.si/id/eprint/6174

Özdemir, H., Bağ, H., and Bilen, K. (2011). Effect of laboratory activities designed based on prediction-observation-explanation (POE) strategy on pre-service science teachers' understanding of acid-base subject. *Western Anatolia Journal of Educational Sciences (WAJES)*. https://acikerisim.deu.edu.tr/xmlui/handle/20.500.12397/5167 (retrieved: 16. 6. 2022)

Predmetnik osnovne šole. (2014). Ministrstvo za izobraževanje, znanost in šport. https://www.gov.si/teme/programi-in-ucni-nacrti-v-osnovni-soli/ (retrieved: 1. 6. 2021)

Puhek, M., Šorgo, A., and Perše, M. (2011). Students' perceptions of real and virtual field work in biology. *Problems of Education in the 21st Century*, 37, 98–107. https://www.researchgate.net/publication/241114833 (retrieved: 23. 10. 2022)

Seid, M. H., Assefa, Y., Muhammed, B. L., Moges, B. T., Birhanu, E. T., Fentaw, Y., Tilwani, S. A., and Ahmed, M. R. (2022). *Education Research International*, 2022, 7254105, https://doi.org/10.1155/2022/7254105

Strmčnik, F. (2001). Didaktika: osrednje teoretične teme. Znanstveni inštitut Filozofske fakultete.

SURS. (2022, junij 17). Delež moških med vodstvenimi delavci v osnovnošolskem izobraževanju enkrat večji kot med vsemi zaposlenimi. https://www.stat.si/StatWeb/News/Index/10389 (retrieved: 13. 3. 2023)

Šorgo, A. (2005). Računalniško podprt laboratorij pri pouku biologije v programu gimnazije. Zavod Republike Slovenije za šolstvo.

Šorgo, A. (2007b). Pomen laboratorijskega dela pri pouku biologije. *Didactica Slovenica Pedagoška obzorja, 22*(3–4), 28–37. http://www.dlib.si/listalnik/URN_NBN_SI_doc-JJHNUGO1/index.html (retrieved: 1. 10. 2021)

Šorgo, A. (2007a). Vpliv računalniško podprtega laboratorija na kakovost pouka biologije in razvoj kompetenc pri dijakih. http://www.digitalna-knjiznica.bf.uni-lj.si/dd_sorgo_andrej.pdf (retrieved: 1. 10. 2021)

Šorgo, A., Verčkovnik, T., and Kocijančič, S. (2007). Laboratorijsko delo pri pouku biologije v slovenskih srednjih šolah. *Acta Biologica Slovenica*, 50, 113–124. https://www.researchgate.net/publication/273947480_Laboratorijsko_delo_pri_pouku_biologije_v_slovenskih_srednjih_solah_Laboratory_work_in_biology_teaching_at_slovene_secondary_schools (retrieved: 1. 10. 2021)

Špernjak, A., and Šorgo, A. (2018). Differences in acquired knowledge and attitudes achieved with traditional, computer-supported and virtual laboratory biology laboratory exercises. *Journal of Biological Education, 52*(2), 206–220. https://doi.org/10.1080/00219266.2017.1298532 (retrieved: 20. 9. 2021)

Toninato, V., and Santovito, G. (2015). The laboratory didactics in the teaching-learning processes of life sciences. An educational project on the structure of the flower and the inflorescences phenomenon in primary school. EDULEARN15 Proceedings, 2245–2254. https://www.researchgate.net/profile/Gianfranco-Santovito/publication/347437527_The_laboratory_didactics_in_the_teaching-learning_processes_of_life_sciences_an_educational_project_on_the_structure_of_the_flower_and_the_inflorescences_phenomenon_in_primary_school/links/5fdb6bbe45851553a0c47b91/the-laboratory-didactics-in-the-teaching-learning-processes-of-life-sciences-an-educational-project-on-the-structure-of-the-flower-and-the-inflorescences-phenomenon-in-primary-school.pdf (retrived: 16. 6. 2022)

Vilhar, B. (2011). Učni načrt. Program osnovna šola. Biologija. Ministrstvo za šolstvo in šport. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_Biologija.pdf (retrieved: 3. 6. 2021)

Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

Darja Antolin Drešar, Maruša Laure,
Sabina Ograjšek, Marta Licardo
Univetrsity of Maribor, Faculty of Education, Maribor, Slovenia
darja.antolin@um, marusa.laure@um.si, sabina.ograjsek@um.si, marta.licardo@um.si

This research explores the mathematical competencies of children in various Slovenian early childhood programmes. The study includes 955 pre-school children, with a balanced gender distribution and a homogeneous age structure. The majority are enrolled in full-day programmes, with fewer in half-day and shorter programmes. Approximately 300 early childhood teachers completed the "KOM5 Competency assessment tool for early childhood children" for each child. The study demonstrates that children's mathematical skills, as assessed by early childhood teachers, significantly improve throughout short programmes. However, when comparing children's competencies in full-day, half-day, and short programmes, it is evident that children in short programmes consistently score lower in mathematical competencies than those in full-day and half-day programmes. Furthermore, the comparison between full-day and half-day programmes reveals no significant differences. The study results are relevant for formulating early childhood education, advocating for a balanced approach that considers both the quality and duration of Slovenian early childhood education.

University of Maribor Press

Matematične kompetence otrok v različnih programih predšolskega izobraževanja v Sloveniji pred vstopom v osnovno šolo

Darja Antolin Drešar, Maruša Laure,
Sabina Ograjšek, Marta Licardo
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
darja.antolin@um.si, marusa.laure@um.si, sabina.ograjsek@um.si, marta.licardo@um.si

Z raziskavo želimo zapolniti vrzel v obstoječih raziskavah o matematičnih kompetencah otrok, ki obiskujejo različne programe predšolske vzgoje v Sloveniji. Raziskava vključuje 955 predšolskih otrok z uravnoteženo razporeditvijo glede na spol in homogeno starostno strukturo. Večina je vpisana v celodnevne programe, manj v poldnevne in krajše programe. Približno 300 vzgojiteljev je za vsakega otroka izpolnilo Pripomoček za ocenjevanje kompetenc predšolskih otrok KOM5. Ugotovitve kažejo, da se matematične kompetence otrok glede na vzgojiteljeve ocene znatno izboljšajo skozi trajanje krajših programov. Vendar pa primerjava kompetenc otrok v celodnevnih, poldnevnih in krajših programih kaže, da otroci v krajših programih dosegajo nižje rezultate v matematičnih kompetencah kot tisti v celodnevnih in poldnevnih programih. Primerjava med celodnevnimi in poldnevnimi programi ne razkriva statističnih razlik. Rezultati raziskave so pomembni za oblikovanje strategij v predšolski vzgoji, saj poudarjajo potrebo po uravnoteženem pristopu, ki upošteva tako kakovost kot trajanje programov predšolske vzgoje.

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

291

1 Introduction

The development of mathematical skills in early childhood is a critical factor in shaping a child's educational trajectory, with a significant emphasis on future academic success. Early exposure to mathematics not only lays a crucial foundation for cognitive development, including skills, such as problem-solving, logical reasoning, and analytical thinking (Sarama and Clements, 2009), but also serves as a strong predictor of later academic achievement across various subjects. This viewpoint is further supported by an array of studies, which collectively indicate that early mathematics skills possess a significant predictive power for later academic success. These skills are also found to be as effective, if not more so, in forecasting reading abilities compared to domain-specific precursors of reading, as demonstrated by researchers, such as Claessens and Engel (2013), Duncan et al. (2007), LeFevre et al. (2010), Morgan et al. (2019), Pagani et al. (2010), Ten Braak et al. (2022), and Watts et al. (2014). This underscores the significance of early mathematical proficiency, as highlighted by the National Mathematics Advisory Panel (2008), which links it to enhanced academic performance, particularly in STEM (Science, Technology, Engineering, and Mathematics) subjects. A multitude of research findings, including those by Gashaj et al. (2023) and Daker et al. (2021), demonstrate that a solid early foundation in mathematics not only correlates with reduced math anxiety but also enhances competence in STEM areas, thereby improving academic performance and readiness for advanced studies.

These insights, emphasizing the integral role of mathematics in early education, are particularly relevant to our study. We aim to explore how various early childhood environments in Slovenia contribute to the development of these foundational mathematical skills. This exploration is crucial as it examines the impact of early mathematical competencies on the children's immediate educational outcomes and their broader academic journey. By focusing on different early childhood settings, our study seeks to enhance the understanding of how early experiences in mathematics can lay a strong foundation for later schooling.

1.1 Mathematical competencies in early childhood education

Defining mathematical competencies in early childhood involves a comprehensive understanding of the range of skills and knowledge that children acquire during their formative years. These skills are not just foundational for future mathematical

understanding but are also crucial for overall cognitive development. The National Council of Teachers of Mathematics (NCTM) (2000) asserts that early mathematical competencies encompass fundamental number sense, pattern recognition, spatial relationships, measurement, and problem-solving abilities. These competencies are the essential building blocks for more complex mathematical concepts and operations.

The Slovenian National Kindergarten Curriculum (Kurikulum za vrtce, 1999) embraces a holistic approach to early mathematical education, where mathematics is defined as one of several equal areas of activity within kindergarten settings. These activities are not conducted in isolation but are interwoven with other curriculum areas. Thus, mathematics holds equal importance to areas, such as movement, language, nature, society, and art, and should be equally represented in activities. However, some studies (e.g., Antolin Drešar, 2010) indicate that mathematics lags behind other areas in kindergartens. The global objectives of mathematics in kindergarten include acquainting children with mathematics in everyday life, developing mathematical expression, thinking and skills, and fostering an experience of mathematics as an enjoyable activity (Kurikulum za vrtce, 1999).

1.2   Factors influencing the development of mathematical skills in early childhood

The development of mathematical skills in early childhood is significantly influenced by a combination of various factors, creating a complex landscape for early learning, in the nurturing thereof parents, often referred to as children's first teachers, play an indispensable role. The home environment, where early learning initiates, is crucial in influencing a child's mathematical development (LeFevre et al, 2009). Leffel and Suskind (2013) emphasize the profound impact of parental engagement and language use at home on developing children's cognitive and mathematical skills. Further supporting this view, the study by Skwarchuk et al. (2014) demonstrates a strong link between informal numeracy activities at home and the enhancement of early numeracy skills. A handful of studies illuminate how parental beliefs, attitudes, and practices profoundly shape the cultivation of early mathematical skills (Muenks et al., 2015; Musun-Miller & Blevins-Knabe, 1998; Silver et al., 2021; Silver et al., 2023; Sonnenschein et al., 2012). These findings highlight the importance of both the frequency and quality of parental engagement in math-related activities. They

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

293

illustrate that a positive parental attitude towards mathematics, combined with active involvement in math-related discussions and activities, creates a supportive environment conducive to children's mathematical growth.

Moving beyond the home environment, the quality of early childhood education and the pedagogical approaches employed are also key in shaping a child's mathematical competencies. Ginsburg et al. (2008) highlight the essential role of early childhood educators in introducing structured mathematical concepts and creating an environment that encourages mathematical exploration and learning. Sarama and Clements (2009) further assert that effective instructional strategies in early childhood significantly enhance mathematical understanding and ability. The National Early Literacy Panel (2008) reinforces the impact of early childhood education settings on mathematical development, emphasizing the importance of early experiences in early childhood settings for children's overall academic readiness and mathematical skills.

As indicated by many previous research studies, the development of mathematical skills in early childhood is significantly influenced by the quality of early education settings. The impact of different early childhood settings, such as full-day and half-day programmes, on children's learning, particularly in mathematics, is a subject of significant educational interest. Full-day programmes, as detailed in studies like those of Walston and West (2004), offer extended opportunities for structured learning and practice. These programmes often provide a more comprehensive curriculum, including a broader range of mathematical activities that can enhance number sense, problem-solving skills, and mathematical reasoning. Children in full-day settings may benefit from a more consistent and in-depth exposure to mathematical concepts, which can lead to stronger foundational math-related skills (Lee et al., 2006; Pelletier & Corter, 2019; Walston & West, 2004). Conversely, half-day programmes, while shorter in duration, can still significantly impact mathematical learning, especially when they are well-structured and focused. Magnuson et al. (2004) suggest that the quality of the respective programme, regardless of its duration, is a critical factor in determining its impact on learning. In half-day settings, focused and intensive teaching of mathematics can foster key competencies, although the limited time available may restrict the breadth of concepts covered. Research indicates that the choice between full-day and half-day early childhood programmes may also interact with other factors, such as family background, socio-economic status, and parental

engagement in education. Loeb et al. (2007) note that the benefits of either programme can be maximized when complemented by a supportive home environment in which children engage in additional learning activities.

1.3 Early childhood education programmes in Slovenia

In Slovenia, the organisational structure and types of programmes offered in kindergartens are governed by the Kindergarten Act (Zakon o vrtcih, 1996). This Act stipulates a range of program options to cater to the varying needs of children and their families. It includes daily programmes designed to last between six to nine hours and scheduled for morning, afternoon, full-day, or on a rotating basis; half-day programmes, spanning four to six hours, also available in morning, afternoon, or rotating schedules; and short programmes, specifically for children from remote and demographically endangered areas, lasting from 240 to 600 hours annually. While the daily and half-day programmes are aimed at children from their first year until school entry, encompassing aspects of education, care, and nutrition, the short programmes target children from three years of age up to school entry, focusing on education, care, and optionally nutrition. The Act mandates that both daily and half-day programmes must be conducted by a combination of early childhood teachers and early childhood assistants, whereas short programmes are exclusively led by a pre-school teacher.

2 Research problem

The primary aim of this research is to explore the mathematical competencies of children in Slovenian pre-school settings, a relatively under-researched area despite extensive international focus on early childhood mathematical development. This study, part of a national evaluation study entitled "Analysis of the Needs, Conditions, and Possibilities for Mandatory Inclusion of Children in One of the Pre-school Education Programmes from the Perspective of Reducing Social, Economic, and Cultural Inequalities" (Licardo et al., 2024), compares the perceptions of early childhood teachers on the mathematical competencies of children in full-day, half-day, and shorter programmes, as well as at the beginning and end of shorter programmes.

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

295

This study is driven by two key research questions: "How do early childhood teachers perceive the development of children's mathematical competencies at the start and end of the shorter programmes?" and "How do early childhood teachers' opinions on the mathematical competencies of children differ across full-day, half-day, and shorter early childhood programmes?" Addressing these questions aims to reveal differences in early mathematical skills based on the length and structure of the respective programme, offering significant contributions to early childhood education research.

3 Methodology

3.1 Sample

The sample for the study was selected from public kindergartens that had previously confirmed their participation in a national evaluation study (Licardo et al., 2024). An invitation to participate in the competency assessment of children in short, half-day, and full-day programmes was extended and was responded to by 105 kindergartens. This study specifically focused on children transitioning to the 1st grade of primary school in September 2023. Three children were randomly selected by early childhood teacher per class to participate therein.

Table 1: Number (f) and structural percentages (f%) of children who were included in the math competencies assessment

Variable	Category	f	f%
Gender	Girl	496	52,2
	Boy	455	47,8
Age	M = 5,89, SD = 0,34		
Slovene as Mother Tongue	Yes	895	94,2
	No	55	5,8
Type of Programme	Full-day Programme	896	93,9
	Half-day Programme	24	2,5
	Shorter Programme	34	2,6
	Total	955	100,0

The sample included 955 pre-school children, with a relatively balanced gender distribution of 52.2% girls and 47.8% boys, as seen in Table 1. The average age of the children in the study was 5.89 years, with a standard deviation of 0.34 years, indicating a homogeneous age structure within the sample. As far as their mother

tongue is concerned, a significant majority (94.2%) spoke Slovene as their first language. Most of the children (93.9%) were enrolled in full-day programmes, with a smaller number attending half-day (2.5%) and shorter programmes (3.7%).

Approximately 300 early childhood teachers also participated in this part of the study by completing the "KOM5 Competency assessment tool for early childhood children" for each child. Although the assessment tool included the code of the respective kindergarten, it did not specify the individual teachers' codes, making it impossible to determine the exact number of participating teachers. Based on the guidelines provided to the teachers, it is estimated that around 300 early childhood teachers were involved in this segment of the study. Assistant early childhood teachers were not included.

3.2   Data collection

As previously noted, the research presented in this paper forms part of a national evaluation study (Licardo et al., 2024). Consequently, the data collection for our study was carried out within the framework of this larger national evaluation.

3.2.1   KOM5 Competency assessment tool for early childhood children

In Slovenia, there has been a noticeable absence of tools designed for educators to assess the competencies of children prior to their school entry. To address this gap, the KOM5 Assessment tool for evaluating early childhood children's competencies was developed. This comprehensive tool encompasses various competency domains that educators can observe in children before they transition to primary school:

- Social and Emotional domain
- Cognition
- Language
- Mathematics
- Social Studies
- Natural Sciences
- Physical Development and Motor Skills
- Art

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

297

Each domain within the tool is accompanied by detailed descriptors or explanations, facilitating a more accurate evaluation of a child's developmental competencies.

Early childhood teachers rated each child on a scale from 1 (not applicable) to 7 (fully applicable), based on observations conducted over a minimum period of three days. These ratings were founded on the child's performance during this specific observational timeframe. For the assessment, educators selected various segments of daily routines or structured activities that provided opportunities for the child to exhibit the respective competencies.

The reliability or internal consistency of the scale for each content section of the questionnaire was determined using Cronbach's alpha coefficient (α). Our analysis confirmed the reliability of the scales across all content domains, with alpha coefficients exceeding 0.7.

This initial version of the instrument, developed collaboratively with multidisciplinary experts, constitutes a significant step towards obtaining a validated and reliable measurement tool for early childhood children's competencies.

3.3   Data analysis procedures

The data collected from survey questionnaires and children's competency assessments were processed using the IBM SPSS Statistics (version 27.0) statistical software. In our data analysis, descriptive statistical methods, including the calculation of frequencies, arithmetic means, and standard deviations, were employed. To determine the reliability of the various questionnaires, Cronbach's alpha coefficient was calculated. Additionally, our data processing included comparative analyses, utilizing the Kruskal-Wallis test as well as the non-parametric Wilcoxon test.

4   Results

This section presents the findings of our study, focusing on the comparison of early childhood teachers' opinions regarding the mathematical competencies of children in various early childhood education programs before entering primary school. The results are divided into two main parts: firstly, the comparison of teachers' views on

children's mathematical competencies at the beginning and end of the shorter programmes, and, secondly, an analysis of these opinions on children's mathematical competencies across different pre-school programmes.

4.1 Comparison of early childhood teachers' opinions on children's competencies at the beginning and end of short programme implementation

The results of comparing early childhood teachers' views on children's mathematical competencies at the beginning and end of the shorter programmes were analysed using the non-parametric Wilcoxon test. This particular test was selected on account of the variables failing to meet the prerequisites for a parametric paired t-test. In the subset of mathematical items, the reliability measure (Cronbach's alpha coefficient) on the data sample for the shorter programmes was also analysed.

Table 2: Differences in educators' opinions on children's competencies in the short programme at the beginning and end of the programme, for mathematics

Math Competencies	N	M1	SD1	Sum of Pos. Ranks	M2	SD2	Sum of Neg. Ranks	Z	P
Counts	29	4.31	1.89	238.5	4.72	2.0	91.5	-3.94	0.150
Uses names for numbers	30	4.07	2.24	253.5	4.53	2.18	75.5	-4.22	0.105
Classifies	35	4.49	1.98	365.5	5.17	1.72	128.5	-4.37	0.054
Adds	23	2.78	1.98	200.0	3.7	2.24	21.0	-3.86	0.013
Subtracts	23	2.57	1.85	177.5	3.43	2.23	20.5	-3.94	0.026
Measures	18	3.0	1.81	110.0	3.89	2.17	16.0	-3.42	0.064
Names basic geometric shapes and solids	24	3.67	1.95	214.5	4.58	1.84	19.5	-4.04	0.009
Understands graphical representations	17	2.82	2.3	75.0	3.41	2.32	0.0	-3.62	0.039
Uses terms for orientation and location	26	3.62	2.12	264.0	4.42	1.98	32.0	-4.15	0.003
Appropriately uses terms for quantities	20	3.65	2.28	87.0	4.0	2.15	32.0	-3.70	0.161
Appropriately continues a pattern	27	4.81	1.92	266.0	5.67	1.24	34.0	-4.30	0.004

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

299

The results regarding the early childhood teachers' assessment of the differences in children's competencies at the beginning and end of the short programme implementation, particularly for the set of mathematical competencies ($\alpha = 0.99$), show that there are statistically significant differences in 7 out of 11 statements. These differences indicate higher early childhood teacher ratings at the end of the short programmes. Specifically, improvements were noted in classifying ($z = -4.37$; $p = 0.054$), adding ($z = -3.86$; $p = 0.013$), subtracting ($z = -3.94$; $p = 0.026$), naming basic geometric shapes and solids ($z = -4.04$; $p = 0.009$), understanding graphical representations ($z = -3.62$; $p = 0.039$), using expressions for orientation and location ($z = -4.15$; $p = 0.003$), and in appropriately continuing a pattern ($z = -4.30$; $p = 0.004$). A trend of differences was also observed in measuring ($z = -3.42$; $p = 0.064$).

It should be noted that the number of children (N) who participated in the assessment process varied for each math competency.

4.2 Comparison of early childhood teachers' opinions on children's competencies in full-day, half-day, and shorter programmes

The competencies of children in full-day, half-day, and shorter programmes were compared utilizing data obtained from the KOM5 questionnaire completed by early childhood teachers for children in groups selected through the random sampling process. Data for the full-day and half-day programmes were collected in April, May, and June 2023, whereas data for the children in shorter programmes were gathered at the end of the implementation thereof (between March and August 2023).

Our research reveals that half-day programs consistently exhibited the highest mean values across all math competencies, except in the case of the »Appropriately continues a pattern« competency, while short programs had the lowest mean values. The results indicate statistically significant differences in early childhood teachers' opinions on children's math competencies across full-day, half-day, and shorter programs for all items as pertaining to mathematics.

Table 3: Differences in early childhood teachers' opinions on children's math competencies in full-day, half-day, and shorter programmes

Math competencies	Programme	N	Mean (M)	Standard Deviation (SD)	$\overline{R}$	Kruskal-Wallis U
Counts	Full-day	897	6.64	0.94	485.83	65.10**
	Half-day	24	6.83	0.48	516.38	
	Short	31	4.74	2.00	205.82	
Uses names for numbers	Full-day	891	6.24	1.33	479.54	29.25**
	Half-day	24	6.58	1.18	558.88	
	Short	31	4.61	2.19	264.10	
Classifies	Full-day	896	6.66	0.80	486.26	51.61**
	Half-day	24	6.83	0.48	531.50	
	Short	34	5.18	1.75	234.66	
Adds	Full-day	870	5.93	1.54	463.94	21.09**
	Half-day	23	6.35	0.88	504.41	
	Short	24	3.83	2.30	236.58	
Subtracts	Full-day	863	5.61	1.73	459.57	19.24**
	Half-day	23	6.13	1.22	524.26	
	Short	24	3.58	2.30	243.31	
Measures	Full-day	812	5.56	1.59	428.56	11.99*
	Half-day	23	6.17	1.07	520.78	
	Short	19	4.05	2.22	269.45	
Names basic geometric shapes and solids	Full-day	889	6.06	1.17	477.78	19.44**
	Half-day	22	6.14	0.83	460.07	
	Short	28	4.57	1.97	263.05	
Understands graphical representations	Full-day	835	5.72	1.44	445.49	23.43**
	Half-day	22	5.95	0.95	453.93	
	Short	21	3.43	2.23	186.10	
Uses terms for orientation and location	Full-day	887	6.05	1.27	476.64	25.96**
	Half-day	23	6.13	1.42	517.22	
	Short	28	4.29	1.98	234.07	
Appropriately uses terms for quantities	Full-day	879	5.94	1.25	471.38	30.60**
	Half-day	23	6.17	0.98	506.54	
	Short	26	3.92	1.98	194.83	
Appropriately continues a pattern	Full-day	894	6.50	0.93	485.10	26.68**
	Half-day	24	6.46	0.78	446.40	
	Short	33	5.52	1.37	277.41	

Note: *$p < 0.05$; **$p < 0.001$

Table 4: Comparative analysis of mathematical competencies across different Slovenian early childhood programmes

Math competencies	Comparison	Test Statistic	Std. Error	Std. Test Statistic	Adj. Sig.	Effect Size
Counts	Short programme - full-day programme	264.227	32.799	8.056	< 0.001	0,26
	Short programme - half-day programme	291.140	48.762	5.971	< 0.001	0,81
	Full-day programme - half-day programme	-26.912	37.127	-0.725	1.000	0,02
Uses names for numbers	Short programme - full-day programme	209.069	39.487	5.295	< 0.001	0,17
	Short programme - half-day programme	278.578	58.697	4.746	< 0.001	0,64
	Full-day programme - half-day programme	-69.509	44.696	-1.555	0.360	0,05
Classifies	Short programme - full-day programme	242.307	32.524	7.450	< 0.001	0,24
	Short programme - half-day programme	275.842	49.567	5.565	< 0.001	0,73
	Full-day programme - half-day programme	-33.535	38.489	-0.871	1.000	0,03
Adds	Short programme - full-day programme	216.232	47.066	4.594	< 0.001	0,15
	Short programme - half-day programme	246.000	66.311	3.710	0.001	0,54
	Full-day programme -	-29.768	48.050	-0.620	1.000	0,02

Math competencies	Comparison	Test Statistic	Std. Error	Std. Test Statistic	Adj. Sig.	Effect Size
	half-day programme					
Subtracts	Short programme - full-day programme	205.033	48.439	4.233	< 0.001	0,14
	Short programme - half-day programme	259.967	68.236	3.810	< 0.001	0,56
	Full-day programme - half-day programme	-54.935	49.451	-1.111	0.800	0,04
Measures	Short programme - full-day programme	155.755	51.518	3.023	0.008	0,10
	Short programme - half-day programme	231.628	68.762	3.369	0.002	0,52
	Full-day programme - half-day programme	-75.873	46.945	-1.616	0.318	0,06
Names basic geometric shapes and solids	Short programme - full-day programme	181.156	67.659	2.677	0.022	0,09
	Short programme - half-day programme	206.615	45.628	4.528	< 0.001	0,64
	Half-day programme - full-day programme	25.459	51.296	.496	1.000	0,02
Understands graphical representations	Short programme - full-day programme	246.251	50.406	4.885	< 0.001	0,17
	Short programme - half-day programme	248.957	69.542	3.580	0.001	0,55
	Full-day programme -	-2.706	49.278	-.055	1.000	0,002

Math competencies	Comparison	Test Statistic	Std. Error	Std. Test Statistic	Adj. Sig.	Effect Size
	half-day programme					
Uses terms for orientation and location	Short programme - full-day programme	237.223	45.121	5.258	< 0.001	0,17
	Short programme - half-day programme	264.780	66.085	4.007	< 0.001	0,56
	Full-day programme - half-day programme	-27.557	49.639	-0.555	1.000	0,02
Appropriately uses terms for quantities	Short programme - full-day programme	261.060	47.443	5.503	< 0.001	0,18
	Short programme - half-day programme	288.522	68.180	4.232	< 0.001	0,60
	Full-day programme - half-day programme	-27.462	50.353	-0.545	1.000	0,02
Appropriately continues a pattern	Short programme - full-day programme	156.259	57.165	2.733	0.019	0,09
	Short programme - half-day programme	196.523	37.817	5.197	< 0.001	0,69
	Half-day programme - full-day programme	40.263	44.114	0.913	1.000	0,03

Table 4 presents a detailed statistical comparison of mathematical competencies among children enrolled in various Slovenian early childhood programmes. The findings reveal significant statistical differences in all areas of mathematics between children in short programmes and those in full-day programmes, with effect sizes ranging from small to moderate according to Cohen (1992). Notably, children in

short programmes consistently exhibit lower competencies compared to their peers in full-day programmes.

Further, pairwise comparisons between children in short programmes and those in half-day programmes also show significant differences in mathematical competencies, with effect sizes being large. Specifically, children in short programmes demonstrate notably lower competencies than those in half-day programmes, highlighting the substantial impact of the respective programme duration on mathematical skill development.

In contrast, comparisons between full-day and half-day programmes across all mathematical competencies reveal no significant statistical differences. This suggests similar levels of mathematical development in these two programme types, indicating that factors other than programme duration might play a pivotal role in the development thereof.

5   Discussion

This study explored differences in early childhood teachers' perceptions of children's mathematical competencies across various early childhood education programs. Two key aspects were examined: the comparison of teachers' opinions of mathematical competencies across different programs and the changes therein from the beginning to the end of shorter programmes.

The findings indicate that children's mathematical competencies, as perceived by early childhood teachers, significantly improve throughout the duration of short programmes. This improvement was evident in several key areas, such as classifying, adding, subtracting, naming basic geometric shapes and solids, understanding graphical representations, using expressions for orientation and location, and appropriately continuing a pattern. These results suggest that short programmes, despite their limited duration, positively impact the development of key mathematical skills in children, resonating with Clements and Sarama's (2007) research on the significant gains in mathematical understanding achievable through focused early childhood education programmes.

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

305

However, in comparing children's competencies in full-day, half-day, and short programmes, a more nuanced picture emerges. Children in short programmes consistently scored lower in mathematical competencies than those in full-day and half-day programmes, contrasting with studies like Weiland and Yoshikawa (2013) and Leak et al. (2010), which suggested limited differences in learning outcomes based on programme duration. Our findings imply that the duration and perhaps the intensity of the programme significantly impact mathematical skill development, aligning with Cooper et al.'s (2010) research on the importance of programme duration in early learning.

Interestingly, the comparison between full-day and half-day programmes revealed no significant differences in mathematical competencies, aligning with Jenkins et al.'s (2016) conclusions that the quality of instructional time might outweigh the quantity. This suggests that the effectiveness of early childhood programmes in mathematics may hinge more on curriculum, teaching methods or other external factors than the programme length.

When reflecting on the implications of our findings, it's essential to recognize potential limitations in our research design. One such consideration is whether the same early childhood teachers who provided assessments also conducted the early childhood education programs for the children they assessed. Despite efforts to reduce bias and ensure objectivity in the assessment process, it's important to acknowledge that the possibility of teacher bias cannot be entirely eliminated. Additionally, it is worth noting that besides different programs, various other external factors may have influenced the observed outcomes. These may include social factors such as the socioeconomic and academic status of families, which warrant further investigation and could be connected with other studies in the field.

Our study contributes to the body of research by highlighting the effectiveness of short programmes in improving mathematical competencies, albeit to a lesser extent than the longer ones. This underscores the need for a balanced approach in early childhood education, where both quality and duration are crucial in children's developmental outcomes. It also highlights the need for further research to explore how different aspects of early childhood programmes interact to influence learning outcomes in mathematics.

6   Conclusion

This research holds significant relevance in the Slovenian context, offering insights into the various early childhood education programmes in terms of young children's mathematical competencies. Our findings have implications for early childhood education in Slovenia, shedding light on how programme lengths and structures contribute to the development of foundational mathematical skills.

It was observed that short programmes effectively enhance mathematical competencies, showing improvements over their duration. However, the lower performance in mathematical competencies among children in short programmes compared to those in full-day and half-day programmes suggests a need to refine these condensed educational experiences in Slovenia.

The absence of significant differences in mathematical skills between children in full-day and half-day programmes is particularly relevant to the Slovenian context, emphasizing quality over quantity in early childhood education. This insight aligns with national educational goals and can guide Slovenian educators and policymakers in developing curricula that emphasize rich, engaging, and comprehensive mathematical learning, regardless of programme length.

References

Antolin Drešar, D. (2020). Planned mathematical activities in Slovenian kindergartens. In A. Lipovec, J. Batič, & E. Kranjec (Eds.), *New horizons in subject-specific education: Research aspects of subjects specific didactics* (1st ed., pp. 253–269). University Press: Faculty of Education. https://press.um.si/index.php/ump/catalog/view/481/590/989-1. https://doi.org/10.18690/978-961-286-358-6.12

Claessens, A., & Engel, M. (2013). How important is where you start? Early mathematics knowledge and later school success. *Teachers College Record*, *115*(6).

Clements, D. H., & Sarama, J. (2007). Early childhood mathematics learning. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 461–555). Information Age Publishing.

Cohen, J. (1992). A power primer. *Psychological bulletin, 112*(1), 155–159.

Cooper, H., Allen, A. B., Patall, E. A., & Dent, A. L. (2010). Effects of full-day kindergarten on academic achievement and social development. *Review of Educational Research*, *80*(1), 34–70. https://doi.org/10.3102/0034654309359185

Daker, R. J., Gattas, S. U., Sokolowski, H. M., Green, A. E., & Lyons, I. M. (2021). First-year students' math anxiety predicts STEM avoidance and underperformance throughout university, independently of math ability. *NPJ Science of Learning, 6*(1), 17.

D. Antolin Drešar, et al.: Mathematical Competencies of Children in Various Early Childhood Education Programmes in Slovenia Before Entering Primary School

307

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

Gashaj, V., Thaqi, Q., Mast, F. W., & Roebers, C. M. (2023). Foundations for future math achievement: Early numeracy, home learning environment, and the absence of math anxiety. *Trends in Neuroscience and Education, 33,* 100217. https://doi.org/10.1016/j.tine.2023.100217

Ginsburg H. P., Lee J. S., & Boyd, J. S. (2008). Mathematics education for young children: What it is and how to promote it. *Social Policy Report: Giving child and youth development knowledge away*, *22*(1), 1–23.

Jenkins, J. M., Watts, T. W., Magnuson, K., Gershoff, E. T., Clements, D. H., Sarama, J., & Weiland, C. (2016). Do high-quality kindergarten and first-grade classrooms mitigate preschool fadeout? *Journal of Research on Educational Effectiveness, 9(*4), 410-432. doi: 10.1080/19345747.2018.1441347.

Kurikulum za vrtce [Kindergarten Curriculum]. (1999). Ljubljana: Ministrstvo za šolstvo in šport, Urad RS za šolstvo.

Leak, J., Duncan, G. J., Li, W., Magnuson, K. A., Schindler, H. S., & Yoshikawa, H. (2010). *Is timing everything?: How early childhood education program impacts vary by starting age, program duration and time since the end of the program* . University of California, Irvine, School of Education.

Lee, V. E., Burkam, D. T., Ready, D. D., Honigman, J., & Meisels, S. J. (2006). Full-day versus half-day kindergarten: In which program do children learn more? *American Journal of Education, 112*(2), 163–208.

LeFevre, J.-A., Fast, L., Skwarchuk, S.-L., Smith-Chant, B. L., Bisanz, J., Kamawar, D., & Penner-Wilger, M. (2010). Pathways to mathematics: Longitudinal predictors of performance. *Child Development, 81*, 1753–1767. https://doi.org/10.1111/j.1467-8624.2010.01508.x

LeFevre, J.-A., Skwarchuk, S.-L., Smith-Chant, B. L., Fast, L., Kamawar, D., & Bisanz, J. (2009). Home numeracy experiences and children's math performance in the early school years. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement, 41*(2), 55–66. https://doi.org/10.1037/a0014532

Leffel, K., & Suskind, D. (2013). Parent-directed approaches to enrich the early language environments of children living in poverty. *Seminars in Speech and Language, 34*(4), 267–278. https://doi.org/10.1055/s-0033-1353443

Licardo, M., Laure, M., Ograjšek, S., Mithans, M., Hmelak, M., Jurgec, A. T., Kranjec, E., Kozjek Varl, K., Bednjički Rošer, B., & Sraka Petek, B. (2024). *Nacionalna evalvacijska študija: Analiza potreb, pogojev in možnosti obveznega vključevanja otrok v enega izmed programov predšolske vzgoje z vidika zmanjševanja socialne, ekonomske in kulturne neenakosti [National evaluation study: Analysis of the needs, conditions, and possibilities for mandatory inclusion of children in one of the pre-school education programs from the perspective of reducing social, economic, and cultural inequalities]*. Maribor: University of Maribor, Faculty of Education..

Loeb S., Bridges M., Bassok D., Fuller B., & Rumberger, R. W. (2007). How much is too much? The influence of preschool centers on children's social and cognitive development. *Economics of Education Review*, *26*, 52–66. http://doi.org/br26m4

Magnuson K. A., Meyers M. K., Ruhm C. J., & Waldfogel, J. (2004). Inequality in Preschool Education and School Readiness. *American Educational Research Journal 41*(1), 15–158.

Morgan, P. L., Farkas, G., Hillemeier, M. M., Pun, W. H., & Maczuga, S. (2019). Kindergarten children's executive functions predict their second-grade academic achievement and behavior. *Child Development, 90*(5), 1802–1816. https://doi.org/10.1111/cdev.13095

Muenks, K., Miele, D. B., Ramani, G. B., Stapleton, L. M., & Rowe, M. L. (2015). Parental beliefs about the fixedness of ability. *Journal of Applied Developmental Psychology, 41*, 78–89. doi: 10.1016/j.appdev.2015.08.002

Musun-Miller, L., & Blevins-Knabe, B. (1998). Adults' beliefs about children and mathematics: how important is it and how do children learn about it? *Early Development and Parenting, 7*, 191–202. doi: 10.1002/(sici)1099-0917(199812)7:4<191::Aid-edp181>3.0.Co;2-i

National Council of Teachers of Mathematics (NCTM). (2000). *Principles and standards for school mathematics*. NCTM.

National Mathematics Advisory Panel. (2008). *Foundations for success: The final report of the National Mathematics Advisory Panel*. U.S. Department of Education.

Pagani, L. S., Fitzpatrick, C., Archambault, I., & Janosz, M. (2010). School readiness and later achievement: A French Canadian replication and extension. *Developmental Psychology, 46*(5), 984–994. https://doi.org/10.1037/a0018881

Pelletier, J. P., & Corter, J. E. (2019). A longitudinal comparison of learning outcomes in full-day and half-day kindergarten. *The Journal of Educational Research, 112*(2), 192–210. https://doi.org/10.1080/00220671.2018.1486280

Sarama, J., & Clements, D. H. (2009). *Early childhood mathematics education research: Learning trajectories for young children*. Routledge.

Silver, A. M., Chen, Y., Smith, D. K., S., C., Cabrera, N., & Libertus, M. E. (2023). Mothers' and fathers' engagement in math activities with their toddler sons and daughters: The moderating role of parental math beliefs. *Frontiers in Psychology, 14*, 1124056. https://doi.org/10.3389/fpsyg.2023.1124056

Silver, A. M., Elliott, L., & Libertus, M. E. (2021). When beliefs matter most: Examining children's math achievement in the context of parental math anxiety. *Journal of Experimental Child Psychology, 201*, 104992. https://doi.org/10.1016/j.jecp.2020.104992

Skwarchuk S.-L., Sowinski C., & LeFevre, J. (2014). Formal and informal home learning activities in relation to children's early numeracy and literacy skills: The development of a home numeracy model. *Journal of Experimental Child Psychology, 121*, 63–84.

Sonnenschein, S, Galindo, C., Metzger, S. R., Thompson, J.A., Huang, H. C., & Lewis, H. (2012). Parents' beliefs about children's math development and children's participation in math activities. *Child Development Research Journal Online,* doi:10.1155/2012/851657

Ten Braak, D., Lenes, R., Purpura, D. J., Schmitt, S. A., & Størksen, I. (2022). Why do early mathematics skills predict later mathematics and reading achievement? The role of executive function. *Journal of Experimental Child Psychology, 214*, 105306. https://doi.org/10.1016/j.jecp.2021.105306

Walston, J.T., & West, J. (2004). *Full-day and Half-day Kindergarten in the United States: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (NCES 2004–078)*. U.S. Department of Education, National Center for Education Statistics. U.S. Government Printing Office.

Watts, T. W., Duncan, G. J., Siegler, R. S., & Davis-Kean, P. E. (2014). What's past is prologue: Relations between early mathematics knowledge and high school achievement. *Educational Researcher, 43*, 352–360. https://doi.org/10.3102/0013189X14553660

Weiland, C., & Yoshikawa, H. (2013). Impacts of a Prekindergarten Program on Children's Mathematics, Language, Literacy, Executive Function, and Emotional Skills. *Child Development*, *84*(6), 2112–2130. http://www.jstor.org/stable/24029681

Zakon o vrtcih [Kindergarten Act]. (1996). Uradni list Republike Slovenije, št. 12/1996, 100/05 – uradno prečiščeno besedilo, in njegove spremembe 25/08, 98/09-ZIUZGK, 36/10, 62/10-ZUPJS, 94/10-ZIU, 40/12-ZUJF, 14/15-ZUUJFO, in 55/17.

Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

Jasmina Ferme,[1] Barbara Arcet,[1,2] Alenka Lipovec[1,2]
[1] Univetrsity of Maribor, Faculty of Education, Maribor, Slovenia
jasmina.ferme1@um.si, barbara.arcet1@um.si, alenka.lipovec@um.si
[2] Univetrsity of Maribor, Faculty of Natural Sciences and Mathematics, Maribor, Slovenia
barbara.arcet1@um.si, alenka.lipovec@um.si

Whole number addition and subtraction are required topics in early-grade mathematics curricula. This study, with a sample size of N=117, introduces a unique method of using self-designed drawings to explore visual representations of mathematical concepts. The collected drawings show how preservice teachers communicate mathematical ideas, and reveal insights into their grasp of the place value concept and potential addition/subtraction teaching visual representations. Results showed that even though a significant portion of the participants demonstrated a clear comprehension of how to teach key mathematical concepts, a prominent trend emerged: about one-third of preservice teachers did not employ base ten grouping in their drawings of two-digit numbers. Similarly, one-third illustrated arithmetic operations symbolically, merely converting numbers into iconic forms, and additionally often misrepresented subtraction. These findings point to specific areas where preservice teachers' meta-representational abilities could be improved. By emphasizing and strengthening these areas in teacher education programs, the pedagogical skills of future educators can be enhanced.

RISBE ŠTUDENTOV RAZREDNEGA POUKA ZA DVOMESTNO SEŠTEVANJE IN ODŠTEVANJE

JASMINA FERME,[1] BARBARA ARCET,[1,2] ALENKA LIPOVEC[1,2]

[1] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
jasmina.ferme1@um.si, barbara.arcet1@um.si, alenka.lipovec@um.si
[2] Univerza v Mariboru, Fakulteta za naravoslovje in matematiko, Maribor, Slovenija
barbara.arcet1@um.si, alenka.lipovec@um.si

Seštevanje in odštevanje števil do 100 je obvezna vsebina v učnih načrtih za matematiko v prvem triletju. Naša študija z vzorcem N=117 uvaja edinstveno metodo uporabe lastnih risb za raziskovanje vizualnih predstavitev matematičnih konceptov. Risbe pokažejo, kako bodoči učitelji razrednega pouka sporočajo matematične ideje, in razkrijejo vpogled v njihovo razumevanje koncepta mestne vrednosti in morebitnih vizualnih predstavitev za poučevanje seštevanja/odštevanja. Rezultati kažejo, da čeprav je velik del udeležencev pokazal jasno razumevanje, kako poučevati ključne matematične koncepte, se je pokazal pomemben trend: približno tretjina udeležencev na svojih risbah dvomestnih števil ni uporabljala grupiranja po deset. Podobno je ena tretjina aritmetične operacije ponazorila simbolno, kjer so števila zgolj pretvorili v slikovne oblike, pogosto pa so tudi napačno prikazali odštevanje. Te ugotovitve kažejo na specifična področja, kjer bi lahko izboljšali metavizualizacijske zmožnosti bodočih učiteljev. S poudarjanjem in krepitvijo teh področij v programih za izobraževanje učiteljev lahko izboljšamo pedagoške spretnosti bodočih učiteljev.

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

311

1 Introduction

Methods of addition and subtraction that emphasize flexible decomposition and combination of numbers, referred to as number-based algorithms or strategies, bolster students' comprehensive grasp of numbers. In everyday scenarios, these computational approaches can often be done mentally. Research on children's usage of strategies in the additive realm indicates that children efficiently and adaptively employ a range of number-based strategies before being introduced to digit-based algorithms (Hickendorff et al., 2019). On the other hand, teacher knowledge is undoubtedly crucial in the challenging and complex process of teaching mathematics. Teacher training programs therefore increasingly promote teachers' mathematical knowledge for teaching that can help preservice teachers (PTs) better prepare for future teaching in multi-number addition and subtraction (Fuson, 1992). To effectively guide PTs in developing this knowledge, educators should understand and expand upon the PTs' foundational conceptions, which can occasionally be elusive (Thanheiser, 2009). Primary PTs come to their mathematics courses fluent in using digit-based algorithms for adding and subtracting multidigit whole numbers, but many are unaware of the essential features inherent in understanding the base-ten place-value system (i.e., grouping, place value, base) that are used for number-based algorithms. Understanding these features is crucial to understanding and teaching multi-digit addition and subtraction. To help PTs develop such knowledge, educators need to know and build upon the PTs' initial conceptions (Thanheiser, 2009). Research on children's conceptions of multidigit whole numbers and computations can serve as a starting point for investigating PTs' conceptions. Two main conceptual aspects of numbers have been identified in literature: understanding of the underlying structure of powers and understanding of how a number can be grouped and regrouped (Valeras & Becker, 1997). This study focuses on the first one.

Employing the drawing-based research method, like other approaches, for example children development tests that include drawings of human figures, has proven valuable in various domains. We posit that drawings created by teachers can serve as indicators of the visual aids they might utilize in instruction. This approach therefore particularly aims to examine teachers' meta-representational (metavisualisation) competence in these mathematical areas. By exploring these aspects, this study seeks to bridge the existing gap in the literature, particularly

enhancing the understanding of visualisation theory in the context of mathematics education, with a focus on two-digit numbers and basic arithmetic operations. By addressing these research inquiries, this study aims to bridge the existing gap in literature concerning visualization theory within mathematics education.

2   Theoretical Background

Strategies for multi-digit arithmetic differ from those for single-digit arithmetic. In single-digit arithmetic, an important distinction is between computational strategies and retrieval. By contrast, in multi-digit arithmetic retrieval of the outcome as an arithmetic fact is not feasible: the outcome needs to be computed. Hence, in multi-digit arithmetic the question is how the numbers are manipulated to find the answer. This is called a (solution) strategy. School children's strategy use in multi-digit arithmetic is a well-researched domain with two subdomains – number-based strategies and digit-based strategies (Torbeyns et al., 2017). In the realm of multi-digit arithmetic strategies, a fundamental distinction lies in the approach taken towards the manipulation of numbers, particularly in relation to the preservation or disregard of their place values. This critical differentiation culminates in two primary categories of strategies: number-based strategies and digit-based strategies (Verschaffel et al., 2007). The most prevalent digit-based strategies encompass written algorithms for operations such as long addition, subtraction, multiplication, and division, which systematically engage with individual digits, typically proceeding from right to left. In contrast, number-based strategies encompass calculation methods that operate on the numeric values of integers within the problem, drawing upon a profound understanding of the fundamental characteristics of the number system and arithmetic operations, a refined numerical intuition, and a solid grasp of elementary number facts. The distinction between the digit-based algorithm, often referred to as traditional, vertical, or operational algorithms, and the number-based approach, sometimes denoted as mental computations, horizontal, or conceptual algorithms, revolves around the treatment of place values within the numbers under consideration. In digit-based algorithms, place values are disregarded (e.g., in traditional or vertical algorithms, 57 - 34 is simplified to 5 - 3 and 7 - 4). Conversely, the number-based approach meticulously respects the place value, subtracting 34 from 57 while employing distinct strategies. The introduction of a digit-based algorithm marks a significant juncture in the realm of multi-digit arithmetic. Prior to its introduction, children typically rely consistently on number-based strategies.

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

313

However, following the introduction of digit-based strategies, children tend to heavily favour the utilization of these digit-based algorithms (Torbeyns & Verschaffel, 2016). Nevertheless, the outcomes concerning the efficiency of number-based versus digit-based algorithms exhibit a degree of inconsistency in the existing literature (Torbeyns et al., 2017; Hickendorff et al., 2019). In Slovenian mathematics textbooks, the number-based approach is instructed from second grade onward, and it is not before the end of the third grade that the digit-based is instructed.

Research indicates that problems centred around addition and subtraction provide an effective context for learning place value concepts (Carpenter et al., 1998). Place value is therefore not only fundamental for computation but also aids learners in understanding the concept as they explore their computing methods (Ebby et al., 2020). Although results differ depending on what and how manipulatives are used in learning situations, learning with manipulatives is correlated positively with later development of mental mathematics achievement, and understanding (Sowell, 1989). For example, Dienes base-10 blocks (a popular mathematics manipulative that contains small units for ones, thin rods for tens, ten-by-ten flats for hundreds, and a large ten-by-ten-by-ten block for thousands place values) improves students' conceptual understanding of arithmetic operations. Manipulatives reinforce understanding of the concept of place value. They help learners grasp the notion of "a ten" as both a single entity and a collection of ten individual units. The models used must be proportional, meaning the representation for ten should be physically ten times larger than that of a single unit (Trimurtini et al., 2019). Non-proportional models, such as those where the representation of ten is not physically larger (like money or chips assigned different values based on colour), are not ideal for introducing the concept of place value. One of the often-used non-proportional manipulatives is a place-value abacus consisting of beads of the same size on vertical wires, where the number of beads on most right wire represents ones, the number of the beads on the next left wire represents the number of tens and so on. Trimurtini et al. (2019) found that 2nd graders who used Dienes cubes (a proportional manipulative) performed statistically better than those who utilised place-value abacus.

In 1986, Shulman emphasized that effective teaching requires more than just subject knowledge. He introduced the concept of pedagogical content knowledge (PCK), which involves understanding how to present content to students appropriately. Later, Ball et al. (2008) expanded on this idea in the context of mathematics, delineating mathematical knowledge for teaching (MKT) into two main components: subject matter knowledge (SMK) and PCK. PCK is further divided into three subcategories: knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of content and curriculum (KCC). KCS involves understanding how students interact with content, including their typical errors and misconceptions. KCT focuses on selecting appropriate teaching methods, tools, and tasks that align with the content. KCC relates to understanding how the content fits within the broader curriculum, including its connections with other subjects.

SMK encompasses common content knowledge (CCK), specialized content knowledge (SCK), and horizon content knowledge (HCK). CCK is the mathematical knowledge shared by most educated people, used for performing standard mathematical operations. SCK, however, is unique to teaching; it includes an understanding of the mathematical concepts' background and how to effectively teach them. For example, in teaching place value, a mathematics teacher should not only know how to use manipulatives to represent place value but also understand the conceptual underpinnings of regrouping and how to evaluate students' understanding. The boundaries between these knowledge categories are fluid and change with a teacher's professional development. A teacher's ability to adapt their teaching based on students' responses or new educational contexts reflects their proficiency in SCK and KCS. Additionally, understanding how different subjects interconnect within the curriculum is crucial, as highlighted by HCK and KCC.

Sun et al. (2019) emphasised the importance of teachers' PCK in whole number addition and subtraction for improving student understanding. Several studies have examined the context of PTs' PCK about multi-digit computations. There is a consistent pattern showing the relationship between teacher knowledge and teaching strategies. Specifically, Özel et al. (2022) reported that PTs justified student solutions based on operational knowledge (traditional algorithms) rather than the conceptual understanding (e. g. number-based algorithms) of multiplication. Verzosa (2020) found that over 90% of the reasoning by Philippine PTs was based mainly on rules

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

315

and procedures, without linking to the quantities in the problem. Kalinec-Craig et al. (2019) report that an overwhelming majority of the PTs used a digits strategy for two-digit subtraction, similar results were found by McClain (2009). Thanheiser (2009), who examined PTs' explanations of standard algorithms for multi-digit computations, reported that two-thirds of the PTs' in her study showed a lack of understanding about digit-based algorithms. In the USA, Son (2016) reported that one fourth of PTs did initially not recognise students number-based strategy as a legitimate method for subtracting. In summary, a prevalent trend among PTs is emphasising operational over conceptual knowledge, which has implications for teaching and student understanding in multi-digit computations. Different methodologies have been used to reach PTs' mathematical knowledge for teaching multidigit computations. Özel et al. (2022) selected problem posing and justification of students' solutions, Verzosa (2020) used interviews in which PTs were asked to describe how they would introduce the concept of multidigit subtraction to their students. McClain (2009) engaged PTs in activities from an instructional sequence designed to support conceptual understanding of both place value and multidigit addition and subtraction and analysed PTs' learning trajectory. Son (2016) analysed PTs' reasoning and responses to students' informal and formal strategies.

This study posits that drawings can serve as a strategy for solving problems and provide insight into the learners' understanding of the mathematical concept (Verschaffel et al., 2020). Selecting efficient drawings for teaching can be challenging for teachers and researchers, as highlighted by diSessa (2004, pp. 293). DiSessa introduced the concept of meta-representational competence, which involves creating and evaluating new representations, understanding their purposes and effectiveness, and explaining their use. This skill, initially studied in learners, is particularly vital for STEM (Science, Technology, Engineering and Mathematics) teachers who must constantly choose effective representations for teaching. These competencies, also known as metavisualisation competences (Chang et al., 2023), form a part of the knowledge of teaching (KCT), emphasizing the selection of adequate and effective presentations in teaching contexts.

Presmeg (2014) stated several questions that need to be addressed in this research domain and pointed out that an overarching visualisation theory in mathematics education has not yet been established. Drawings can be seen as representations or as processes of meaning-making. In this study, the first approach was adopted. It

was assumed that there is a matching representation for the underlying concept; accordingly, there is a corresponding (matching, adequate, appropriate) drawing for a given concept. The line of research by Jitendra and colleagues (e.g., Jitendra & Hoff, 1996) demonstrated the effectiveness of the approach where children were identifying, drawing, and completing a teacher-imposed schematic drawing in a wide variety of types of word problems, age levels, and target groups. Since drawings are usually chosen by teachers it is especially important to know which drawings PTs produce.

This study aimed to fill the gap in literature regarding PTs' mathematical knowledge for teaching number-based algorithms. However, an innovative strategy based on drawing as a research method that was not used so far, was used in this study. Additionally, this study posits that teacher-generated drawings are a good indicator of visual representations that teachers will use in teaching. Models (including visual representations) used in teaching mathematics are key predictors of students' mathematics achievements (Presmeg, 2014). Answering research questions arising from this research problem therefore addresses the gap in the literature regarding visualisation theory in mathematics education.

The research questions of the study were to find out:

How do primary preservice teachers represent two-digit numbers?

How do primary preservice teachers represent addition and subtraction with two-digit numbers?

3   Methodology

The study utilized a drawing-based approach to probe the mathematical understanding of PTs at the University of Maribor. The participants in the study were PTs in the 3rd and 4th-year of the Primary School Teaching program at the Faculty of Education, University of Maribor (N=117). The sample was chosen through convenience sampling. Data were collected through an anonymous questionnaire, the results of which did not affect PCTs' grades in any way. The data collection occurred in the year 2022. Participants were provided with very scant instruction, namely to: Draw pictures representing: (a) $25 + 37$, (b) $45 - 17$.

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

317

Arithmetic expressions were written horizontally since writing arithmetic computation problems horizontally instead of vertically prompts learners to rely less on standard algorithms (Humphreys & Parker, 2015). The data analysis was conducted in three distinct phases. In the initial stage, inappropriate drawings were filtered out, setting the groundwork for a systematic categorization. This categorization hinged on the portrayal of two-digit numbers and the representation of mathematical operations. Following the qualitative analysis, quantitative analysis methods were applied. In the continuation of this section, a more detailed exploration of each of these phases is provided.

In the study's initial phase, drawings were analysed for their appropriateness in representing mathematical concepts. Only drawings that meaningfully depicted both numbers in a mathematical expression, rather than just the result, were selected for further analysis. Drawings that either failed to present the given numbers, showed only the computation or result, or included figures unrelated to the mathematical expression, were deemed inappropriate and excluded. Figure 1 in the study illustrates examples of such inappropriate drawings.
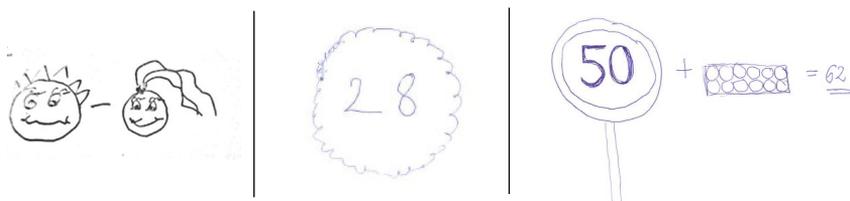

Figure 1: Three examples of inappropriate drawings: the first one contains only a figure unrelated to mathematical concepts, the second one presents the result of a given mathematical expression, while the third one depicts a non-initial one step in the computation of a given addition expression.

For each appropriate drawing the following aspects were examined: the presentation of two-digit numbers; the presentation of mathematical operation.

Hence, in the second phase of this research we looked for codes through a systematic coding process; then these codes were combined into categories (types of drawings). Precise criteria were established for categorising participants' drawings into a particular code through coding. The presentation of findings is illustrated with

concrete examples of participants' drawings to strengthen the validity and reliability of the results.

From the perspective of representing two-digit numbers, the first step involved determining the symbolic nature of each representation. A presentation of a number is designated as a symbolic representation when a given number is written with a symbol, and there are no additional reasonable presentations representing numbers (not symbols). In Figure 2, three examples of symbolic and non-symbolic representations of numbers are shown.
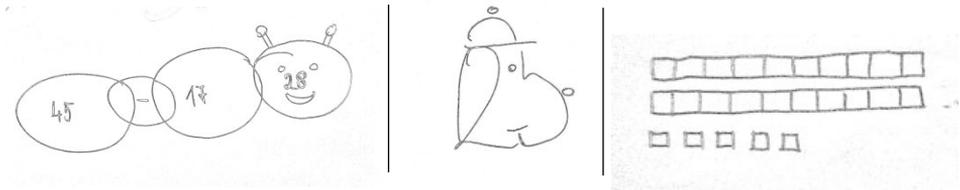

Figure 2: A symbolic representation of numbers 45 and 17 (left figure), a symbolic representation of a number 25 integrated into a depiction of a dog (second figure), and non-symbolic representation of number 25 (right figure).
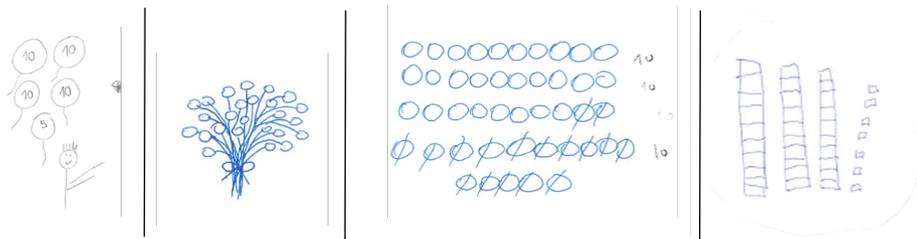

Figure 3: A non-proportional model for presenting the number 45, a proportional non-grouped model for presenting the number 25, a proportional model for presenting the number 45 (grouped model with implicit grouping), and a proportional model for 37 (grouped model with explicit grouping).

Further, for each non-symbolic representation it was ascertained whether the model for each two-digit number was proportional or non-proportional. If a model was proportional, we checked whether the elements representing numbers were grouped or not. As a grouped proportional model, we considered representations of numbers using elements that were either explicitly (the group is illustrated) or implicitly (the group is not illustrated, but it is evident from the image) grouped together into the

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

319

groups with the same number of elements. Examples of each mentioned category are shown in Figure 3. In cases where a grouped proportional model was employed, the number of elements within these groups was evaluated.

In the realm of representing mathematical operations, the focus of this study extended to determining whether the drawings presented a symbolic or non-symbolic representation of a given operation. More precisely, an investigation was conducted to ascertain whether the drawings included symbols for addition (i.e., the symbol "+") and subtraction (i.e., the symbol "-"). Furthermore, our emphasis lay in determining whether the generated drawings correspond to the underlying concept of addition and subtraction of two-digit numbers. Note that the (separate, distinct) presentation of both given numbers from an expression without the inclusion of a symbol for the given operation between them is consistent with the concept of addition, but not with the concept of subtraction. Consequently, each such representation is considered as appropriate in the case of addition, but inappropriate for subtraction. Furthermore, each representation of an operation that includes a symbol for the operation is deemed appropriate from the perspective of operations. Figures 4 and 5 illustrate instances of both of symbolic and non-symbolic representations of mathematical operations.
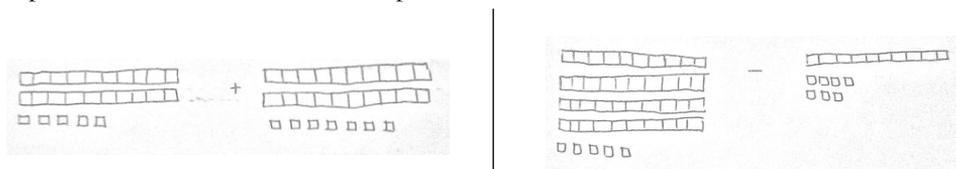

**Figure 4: Symbolical representations of addition and subtraction
(including symbol "+" or "-") corresponding to the underlying concept.**

The left and right drawings in Figure 4 show the interlacing of the addition (+) and subtraction (-) symbols and the iconic representations of the numbers over which the two operations are performed. The symbolic notation of the numbers is only translated into iconic form (squares), the context of the mathematical operation (addition or subtraction) is still encoded in the symbol.
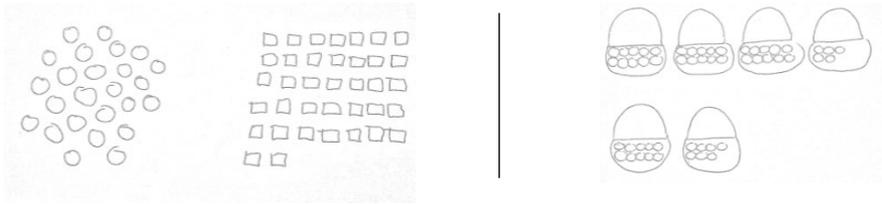
Figure 5: Representations of addition and subtraction without usage of symbols "+" or "-": the first one represents the expression 25+37 and is appropriate, while the second one depicts the expression 45-17 (35-17) and is not appropriate.

The left and right drawings in Figure 5 show addition and subtraction without the use of the + and - symbols. The addition results in a correct representation of the part-part-whole structure. In the case of subtraction, however, the drawing obtained by translating only the minuend and subtrahend into iconic form (circles) is not correct, as it is usually interpreted as the addition of the minuend and subtrahend.

To ensure the accuracy of the analysis in both phases of the study, three researchers conducted the coding, resolving any discrepancies through discussion and re-evaluation. The study acknowledges potential limitations in using drawings as data, as highlighted in existing literature (Pehkonen et al., 2016). A key limitation was that participants were not asked to explain their drawings, possibly leading to different interpretations of their meaning compared to the authors' inferences. This contrasts with Badillo et al.'s (2015) study where children verbally explained their drawings.

4   Results

Among all the drawings, there were eight inappropriate drawings representing addition expressions and eleven drawings representing subtraction expressions. Several of them solely depicted the result of the expressions or their computations, while others included only graphical representations devoid of numerical values. In the continuation of this section, only appropriate drawings are considered. The presented findings are related to the presentation of two-digit numbers and the presentation of mathematical operations.

From the perspective of the presentation of two-digit numbers, the initial inquiry of this study focused on whether the research participants employed symbolical or non-symbolical representations of numbers. Four drawings from this study portray

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

321

addition expressions and six drawings depict subtraction expressions, which contain only a symbolical representation of numbers without the iconic presentation. Further, in instances of non-symbolic representations of numbers, the utilization of proportional or non-proportional models was investigated. As indicated in Table 1, more than 94% of the students used a proportional model for representing numbers in addition expression. In the case of subtraction, the proportion of students employing a proportional model was 91% or more.

Table 1: Usage of a proportional model.

Usage of a proportional model	25 (+) f (f %)	37 (+) f (f %)	45 (-) f (f %)	17 (-) f (f %)
No	6 (5,7)	5 (4,8)	9 (9)	8 (8)
Yes	99 (94,3)	100 (95,2)	91 (91)	92 (92)
Total	105 (100)	105 (100)	100 (100)	100 (100)

The next step was to determine whether the elements representing numbers, when the proportional model was utilized, were grouped together. Results are presented in Table 2.

Table 2: Grouping in the representations, using the proportional model.

Grouped model	25 (+) f (f %)	37 (+) f (f %)	45 (-) f (f %)	17 (-) f (f %)
Yes	65 (65,7)	68 (68)	63 (69,2)	63 (68,5)
No	34 (34,3)	32 (32)	28 (30,8)	29 (31,5)
Total	99 (100)	100 (100)	91 (100)	92 (100)

In instances where groupable proportional models were employed, the quantity of elements within these groups was analysed. As shown in Table 3, the majority of students who used a groupable proportional model formed groups of ten elements. Note that in this table only the results for the cases of groups are presented, when at least three students represent them.

Table 3: The number of elements in group when some groupable proportional model was used.

The number of elements in a group	25 (+) f (f %)	37 (+) f (f %)	45 (-) f (f %)	17 (-) f (f %)
5	17 (26,2)	7 (10,3)	9 (14,3)	9 (14,3)
6	0 (0)	4 (5,9)	0 (0)	1 (1,6)
7	1 (1,5)	2 (2,9)	0 (0)	1 (1,6)
9	0 (0)	0 (0)	3 (4,8)	3 (4,8)
10	46 (70,7)	49 (72,1)	43 (68,3)	42 (66,7)
11	0 (0)	0 (0)	2 (3,2)	2 (3,2)
12	0 (0)	0 (0)	2 (3,2)	1 (1,6)
20	0 (0)	0 (0)	3 (4,8)	3 (4,8)
Total	65	68	63	63

In Figure 6 some examples of grouping into groups of order five, seven and ten are shown.
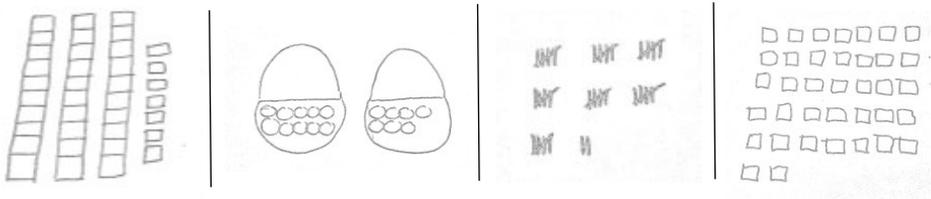

Figure 6: Grouping of elements into groups of order ten (first and second figure), five (third figure) and seven (fourth figure).

Next, the results pertaining to the presentation of mathematical operations are presented. Results showed that 40 (38,1%) representations for addition expressions are symbolic (include a symbol for addition, i.e., the symbol "+"). Similarly, 34 (34%) of representations for subtraction expressions that contained a symbol for subtraction (i.e., the symbol "-"). Recall that each representation of an operation that includes a symbol "+" or "-" is appropriate.

As mentioned, the separate presentation of both given numbers from an expression without the inclusion of a symbol for the given operation between them aligns with the concept of addition, but not with the concept of subtraction. There are 65 (61,9%) representations for addition that do not include the symbol "+" and are thus considered appropriate. In contrast, there is 13 (13%) representations for

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

323

subtraction that present both numbers from the expression but omit the symbol "-" and are therefore deemed inappropriate. The described results are summarized in Table 4.

Table 4: The usage of symbols "+" and "-".

	Addition: usage of symbol »+« f (f %)	Subtraction: usage of symbol »-« f (f %)
No	65 (61,9)	66 (66)
Appropriate	65 (61,9)	53 (53,0)
Inappropriate	0 (0)	13 (13,0)
Yes	40 (38,1)	34 (34,0)
Appropriate	40 (38,1)	34 (34,0)
Inappropriate	0 (0)	0 (0)
Total	105 (100)	100 (100)
Appropriate	105 (100)	87 (87,0)
Inappropriate	0 (0)	13 (13,0)

5 Discussion

The first aim of this study was to identify how PTs' drawings depicted multidigit numbers. In the initial analysis, an evaluation was made of whether PTs opted for a proportional model in their representations. As highlighted in Table 1, an overwhelming majority, over 90% of PTs, chose to use a proportional model for illustrating numbers in addition and subtraction tasks. This suggests that the PTs possess a solid grasp of effective representations suitable for young learners. Several studies, including those by Trimurtini et al. (2019) and Rojo et al. (2021), have reported that proportional models are superior in efficacy compared to non-proportional models. Specifically, Rojo et al. (2021) argued that models which adhere to a physical base-10 proportion, such as proportional models, are optimal for teaching the inherent multiplicative patterns found in place value, contrasting non-proportional models like place value chips which don't maintain this proportion. Slovenian future primary teachers seem well-aware of this distinction, suggesting that, from the standpoint of choosing between proportional and non-proportional models, their SCK regarding manipulatives appears to be robust.

The second important characteristics of models is whether they are pregrouped. Approximately one third of students (see Table 2) did not use groups in their pictures. Base ten models can be broadly classified into two categories: groupable

(like bundles of tens and ones, or cups of tens and ones) and pregrouped (for instance, Dienes blocks). The pregrouped models are frequently depicted in textbooks and often employed in instructional activities (Rojo et al., 2021), however it seems that using groupable manipulatives maintains germane cognitive load where new information is processed into long-term memory (Sweller et al., 1998). It could be that one third of PTs' who did not use groups thought that this type of manipulative would benefit children more, however this is highly unlikely. A more plausible explanation is that these PTs do not have well-developed SCK regarding place value.

The third characteristic examined was the use of groupings by tens. Surprisingly, approximately one third (see Table 3) of the students who presented groupable proportional models did not employ groupings of ten in their drawings. Previous research, such as that by McClain (2009), highlighted that PTs often struggle with the place value of multi-digit numbers, especially when considering addition or subtraction in number bases other than ten. In Slovenia, recommendations by McClain (2009) regarding activities in number bases different from ten have been integrated into mathematical courses, emphasizing the efficiency of the 10-base system. Consequently, it was anticipated that a larger portion of PTs would instinctively use groups of ten. Dishearteningly, the findings of this study resonate with several studies suggesting PTs' challenges with comprehensively understanding the place value of whole numbers. Thanheiser (2009) noted that PTs frequently miss the relationship between different unit types (such as ones, tens, hundreds). Consistently, in our data, among students who presented groupable proportional models there are just slightly over 60% of them effectively represented numbers using groups of ten. This result further indicates that their SCK for teaching place-value may not be sufficiently robust.

The following section of the discussion focuses on the results concerning arithmetic operations, namely addition and subtraction. This combination of representing numbers visually as objects while also interspersing them with arithmetic symbols (compare right drawing on Figure 1) has parallels in earlier studies. For example, both children's conceptual renderings (e.g., Lipovec, 2023; Lipovec & Podgoršek Mesarec, 2017) and those of preservice primary educators (e.g., Lipovec & Antolin Drešar, 2015; Lipovec & Podgoršek Mesarec, 2016) have shown similar patterns. The data collected in this study showed that around a third of PTs' drawings (as

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

325

referenced in Table 4) incorporated symbols for addition or subtraction. Fuson (1992) also observed a similar trend in children's drawings (as depicted in Figure 5 of Fuson's study) but did not delve deeper into the implications of this observation. What stands out about this type of representation is that it does not neatly fit into the categorization set forth by Hegarty and Kozhevnikov (1999). According to their classification, drawings are typically either "pictorial" (i.e., realistic visualizations of problem objects), or "schematic" (i.e., illustrations emphasizing the essential spatial relationships of a problem). Of these, Hegarty and Kozhevnikov (1999) noted that employing schematic representations tends to bolster success in mathematical problem-solving. The observed "interplay" (combining symbolical signs "+" and "-" with pictorial drawings of objects representing numbers in arithmetic expressions 25+37 and 45-17) in this study hints at a nuanced middle ground, underscoring the evolving complexities of visual mathematical representation. There were around 48% of participants using interplay in addition and 34% of PTs for subtraction (see Table 4). Those participants exhibited weaker SCK regarding the representations of addition and subtraction for younger students. It is likely that such PTs might not opt for schematic drawings when teaching, which, as noted by Hegarty and Kozhevnikov (1999), can be more beneficial for mathematical problem-solving. This deficiency in SCK could have implications for their effectiveness in conveying mathematical concepts to students.

It is noteworthy that almost a half of the primary PTs, 47%, chose to depict the subtraction of 45-17 by illustrating 45 objects followed by an additional 17 objects. Note that if such depiction contains a sign for subtraction, then it is appropriate (34% of depictions), otherwise it is inappropriate (13% of depictions). Traditionally, one would represent subtraction by drawing 45 objects and then crossing out 17 of them. This often-used unconventional method suggests a potential gap or misunderstanding in their foundational comprehension of subtraction. These observations further underscore concerns about some PTs having a weaker SCK when it comes to basic arithmetic operations.

6   Conclusion

Teachers' ability to choose effective visual methods for teaching mathematical concepts (teachers' meta-representational skills) was highlighted in the study through PTs' self-designed drawings. These drawings particularly shed light on their grasp of

the place value system and how they visually represent addition and subtraction concepts. Although many PTs demonstrated a clear understanding of foundational concepts, a notable trend was observed among those who struggled with grouping numbers in sets of ten, indicating areas for improvement in their mathematical knowledge for teaching. The study contributes to the debate on digit-based versus number-based algorithms in mathematics education, highlighting the need for conceptual understanding and strategy flexibility. It suggests that primary PTs, influenced by their experience with digit-based algorithms, might not be as adept as young children in using number-based strategies. The study underscores the potential benefits of "number talks" (Humphreys & Parker, 2015), a method of engaging students in discussing diverse computational strategies, though it notes that this approach is underutilized in Slovenian classrooms.

References

Antolin Drešar, D., & Lipovec, A. (2015). Slovenian pupils' conceptions of the mathematician profession. In O. Fleischmann (Ed.), *The teaching profession: new challenges - new identities?* (pp. 21-29). Wien, Zürich, Münster: LIT.

Badillo, E., Font, V., & Edo, M. (2015). Analyzing the responses of 7-8 year olds when solving partitioning problems. *International Journal of Science and Mathematics Education, 13*, 811-836. https://doi.org/10.1007/s10763-013-9495-8

Ball, D. L., Thames, M. H., & Phelps, G. C. (2008). Content Knowledge for Teaching What Makes It Special? *Journal of Teacher Education, 59*(5), 389-407. https://doi.org/10.1177/0022487108324554

Carpenter, T. P., Franke, M. L., Jacobs, V. R., Fennema, E., & Empson, S. B. (1998). A longitudinal study of invention and understanding in children's multidigit addition and subtraction. *Journal for Research in Mathematics Education, 29*(1), 3-20. https://doi.org/10.2307/749715

Chang, H.-Y., Binali T., & Chang, Y-J. (2022). Developing an instrument for metavisualization and investigating relationships among dimensions of metavisualization, *Research in Science & Technological Education,* https://doi.org/10.1080/02635143.2022.2128325

diSessa, A. A. (2004). Metarepresentation: native competence and targets for instructions. *Cognition and Instruction, 22*(3), 293-331. http://www.jstor.org/stable/3233911

Ebby, C., Hulbert, E., & Broadhead, R. (2020). *A Focus on Addition and Subtraction: Bringing Mathematics Education Research to the Classroom.* Routledge. https://doi.org/10.4324/9781003038337

Fuson, K. C. (1992). Research on learning and teaching addition and subtraction of whole numbers. In G. Leinhardt, R. T. Putnam, & R. A. Hattrup (Eds.), *Analysis of arithmetic for mathematics teaching* (pp. 53-187). Lawrence Erlbaum Associates, Inc.

Hegarty, M., & Kozhevnikov, M. (1999). Types of visual-spatial representations and mathematical problem solving. *Journal of Educational Psychology, 91*(4), 684-689. https://doi.org/10.1037/0022-0663.91.4.684

Hickendorff, M., Torbeyns, J., & Verschaffel, L. (2019). Multi-digit Addition, Subtraction, Multiplication, and Division Strategies. In A. Fritz, V. G. Haase, & P. Räsänen (Eds.), *International Handbook of Mathematical Learning Difficulties* (pp. 543-560). Cham: Springer. https://doi.org/10.1007/978-3-319-97148-3_32

J. Ferme, B. Arcet, A. Lipovec: Primary Preservice Teachers' Drawings of Number-Based Two-Digit Addition and Subtraction

327

Jitendra, A. K., & Hoff, K. (1996). The effects of schema-based instruction on the mathematical word-problem solving performance of students with learning disabilities. *Journal of Learning Disabilities, 29*, 422-432. https://doi.org/10.1177/002221949602900410

Kalinec-Craig, C. A., Prasad, P. V., Mira, R. V., & Walls, C. (2019). Unpacking the Algorithm: Rethinking Elementary Pre-Service Teachers' Strategies for Solving Multi-Digit Addition Problems. *Issues in the Undergraduate Mathematics Preparation of School Teachers*(1). https://files.eric.ed.gov/fulltext/EJ1206261.pdf

Lipovec, A. (2023). Learner-generated drawings : the case of fractions. In A. Žakelj, M. Cotič, D. M. Kadijevich, & A. Lipovec (Eds.), *Selected topics in the didactics of mathematics* (pp. 53-67). Koper: Založba Univerze na Primorskem. https://www.hippocampus.si/ISBN/978-961-293-186-5.pdf

Lipovec, A., & Antolin Drešar, D. (2015). Shematic and pictorial representations of exponentiation. In O. Fleischmann (Ed.), *The teaching profession: new challenges - new identities?* (pp. 137-144). Wien; Zürich; Münster: LIT.

Lipovec, A., & Podgoršek Mesarec, M. (2016). Risba kot orodje za vpogled v matematično razumevanje. *Psihološka obzorja, 25*, 31-53. https://doi.org/10.20419/2016.25.452

Lipovec, A., & Podgoršek Mesarec, M. (2017). Students' visual representation of fractions and exponentiation. In J. Novotna, & H. Moraova (Ed.), *Equity and diversity in elementary mathematics education : proceedings. International Symposium Elementary Maths Teaching* (pp. 319-327). Prague: Charles University, Faculty of Education, Prague, Czech Republic.

McClain, K. (2009). Supporting preservice teachers' understanding of place value and multidigit arithmetic. *Mathematical Thinking and Learning*, 5(4), 281-306. https://doi.org/10.1207/S15327833MTL0504_03

Özel, Z., Yılmaz, A., Işıksal-Bostan, M., & Özkan, B. (2022). Investigation of the Specialized Content Knowledge of the Pre-service Primary School Teachers about Multiplication. *International Journal for Mathematics Teaching and Learning, 23*(2), 115-143. https://doi.org/10.4256/ijmtl.v23i2.464

Pehkonen, E., Ahtee, M., & Laine, A. (2016). Pupils' drawings as a research tool in mathematical problem-solving lessons. In E. Pehkonen (Ed.), *Posing and Solving Mathematical Problems* (pp. 167-188). Cham: Springer. https://doi.org/10.1007/978-3-319-28023-3_11

Presmeg, N. (2014). Contemplating visualization as an epistemological learning tool in mthematics. *ZDM Mathematics Education, 46*, 151-157. https://doi.org/10.1007/s11858-013-0561-z

Rojo, M. M., Knight, B., & Bryant, D. P. (2021). Teaching Place Value to Students With Learning Disabilities in Mathematics. *Intervention in School and Clinic, 57*(1), 32-40. https://doi.org/10.1177/1053451221994827

Shulman, L. S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4-14. https://doi.org/10.2307/1175860

Son, J.-W. (2016). Moving beyond a traditional algorithm in whole number subtraction: Preservice teachers' responses to a student's invented strategy. *Educational Studies in Mathematics, 93*, 105-129. https://doi.org/10.1007/s10649-016-9693-8

Sowell, E. J. (1989). Effects of manipulative materials in mathematics instruction. *Journal for Research in Mathematics Education, 20*, 498-505. https://doi.org/10.2307/749423

Sun, X. H., Xin, Y. P., & Huang, R. (2019). A complementary survey on the current state of teaching and learning of whole number arithmetic and connections to later mathematical content. *ZDM, 51*, 1-12. https://doi.org/10.1007/s11858-019-01041-z

Sweller, J., van Merrienboer, J. J., & Paas, F. G. (1998). Cognitive Architecture and Instructional Design. *Educational Psychology Review, 10*, 251-296. https://doi.org/10.1023/A:1022193728205

Thanheiser, E. (2009). Preservice elementary school teachers' conceptions of multidigit whole numbers. *Journal for Research in Mathematics Education*, 40(3), 251-281. https://www.jstor.org/stable/40539337

Torbeyns, J., & Verschaffel, L. (2016). Mental computation or standard algorithm? Children's strategy choices on multi-digit subtractions. *European Journal of Psychology of Education*, *31,* 99-116 https://doi.org/10.1007/s10212-015-0255-8

Torbeyns, J., Hickendorff, M., & Verschaffel, L. (2017). The use of number-based versus digit-based strategies on multi-digit subtraction: 9–12-year-olds' strategy use profiles and task performance. *Learning and Individual Differences*, *58,* 64-74. https://doi.org/10.1016/j.lindif.2017.07.004

Trimurtini, Sofianingsih, E., Widihastrini, F., & Sumilah. (2019). The Effectiveness of Proportional Material in Representing Place Values in The Mathematics Learning of 2nd Grade Elementary School Students. In *Proceedings of the International Conference Primary Education Research Pivotal Literature and Research UNNES 2018 (IC PEOPLE UNNES 2018)* (pp. 164-168). Atlantis Press. https://doi.org/10.2991/icpeopleunnes-18.2019.32

Valeras, M., & Becker, J. (1997). Children's developing understanding of place value: Semiotic aspects. *Cognition and Instruction, 15,* 265-280.

Verschaffel, L., Greer, B., & De Corte, E. (2007). Whole number concepts and operations. In F. K. Lester Jr. (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 557-628). Greenwich: Information Age Publishing.

Verschaffel, L., Schukajlow, S., Star, J., & van Dooren, W. (2020). Word problems in mathematics education: a survey. *ZDM Mathematics Education, 52,* 1-16. https://doi.org/10.1007/s11858-020-01130-4

Verzosa, D. B. (2020). Pre-service elementary teachers' reasoning in introducing multidigit subtraction. *International Journal of Mathematical Education in Science and Technology*, *51*(6), 876-892. https://doi.org/10.1080/0020739X.2019.1647573

SUSTAINABILITY IN GEOGRAPHICAL EDUCATION

EVA KONEČNIK KOTNIK
University of Maribor, Faculty of Arts, Maribor, Slovenia
eva.konecnik@um.si
University of Maribor, Faculty of Education, Maribor, Slovenia
eva.konecnik@um.si

The Sustainability in Geography Education study focuses on a quantitative and qualitative analysis of sustainability learning tasks in a sample of geography teaching materials for primary and secondary schools. The quantitative analysis shows that the proportion of learning tasks following the principle of sustainability is higher in secondary school teaching materials compared to primary school teaching materials. The qualitative analysis showed that the learning tasks, regardless of the age of the learners, unevenly develop the levels of transformative learning for sustainability or green competences, with the level of embracing complexity in sustainability being the best represented of the analysed learning tasks, and the level of imagining sustainable futures and the level of taking action for sustainability being the least represented. Although aspects of sustainability are already intertwined with various geography curricula, both in basic science and in geography teaching, there are development opportunities in geography education, especially in the direction of action for sustainability.

University of Maribor Press

TRAJNOSTNOST V GEOGRAFSKEM IZOBRAŽEVANJU

EVA KONEČNIK KOTNIK

Univerza v Mariboru, Filozofska fakulteta, Maribor, Slovenija
eva.konecnik@um.si
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
eva.konecnik@um.si

Raziskava Trajnostnost v geografskem izobraževanju se osredotoča na kvantitativno in kvalitativno analizo učnih nalog, ki sledijo načelu trajnostnosti, v vzorcu učnih gradiv za pouk geografije v osnovnih in srednjih šolah. Kvantitativna analiza je pokazala, da je delež učnih nalog, ki zasledujejo načelo trajnostnosti v srednješolskih učnih gradivih višji v primerjavi z osnovnošolskimi učnimi gradivi. Kvalitativna analiza je pokazala, da učne naloge, ne glede na starost udeleženih v izobraževalnem procesu, neenakomerno razvijajo ravni transformativnega učenja za trajnostnost oz. zelenih kompetenc, pri čemer je v analiziranih učnih nalogah najbolj zastopana raven sprejemanja kompleksnosti v trajnostnosti, najmanj pa sta zastopani raven zamišljanja trajnostnih prihodnosti ter raven ukrepanja za trajnostnost. Kljub temu, da se trajnostni vidiki že sedaj tako v bazični znanosti kot pri pouku geografije prepletajo z različnimi geografskimi učnimi vsebinami, je mogoče zaznati, da so v geografskem izobraževanju razvojne priložnosti, zlasti v smer ukrepanja za trajnostnost.

Univerzitetna založba
Univerze v Mariboru

1   Introduction

Sustainability is a principle that fundamentally refers to an orientation towards meeting the living needs of the present generation (especially in economic terms – raw materials, energy) in a way that does not compromise the environment and the concomitant needs of future generations. Alongside this fundamental orientation, the principle also includes broader contexts, which we highlight below. The term *trajnostnost* (in Slovenian language) is derived from the English term *sustainability* (coined in the subtitle of the World Conservation Strategy report, linked to the IUCN debate on World Natural Heritage), which has another partly corresponding term in Slovenian in terms of its core message; this is the term *sonaravnost* (Plut, 2002; Plut, 2005), which also means "the principle that there must be a dynamic balance between the use and regeneration of natural resources, which means that natural resources of raw materials and energy must also be available for future generations" (Paulin, 2007). The term *sustainability* is also translated into Slovenian by the phrase *sustainable development*. Although this phrase is often used, the concept of sustainability represents a professional redefinition of this phrase. The need for redefinition has arisen because the term *sustainable development*, with its explicit diction, emphasises or even overemphasises development, i.e. (also) economic growth (which may initially be misunderstood as the necessity for development towards materialism) (Plut, 2005; Vovk, Davidović, 2023), which often excludes social justice and the preservation of natural resources or having an environment that is healthy or at least in solid condition. The notion of sustainability, on the other hand, by its explicit diction, excludes the verticality of development growth and implies circularity (e.g., circular economy). The principle of sustainability comprises three building blocks and is understood as development progress that harmonises or balances economic activity, the social sphere and the natural environment as much as possible, i.e., it emphasises broader contexts than the economy or economic growth alone (Werbach, 2011).

International efforts in environmental education date back to the 1970s, when United Nations intergovernmental conferences on environmental education were launched in response to the increasing environmental degradation caused by population and intensive industrial growth. Thus, in 1976, the Tbilisi Declaration highlighted "the important role of environmental education for the protection and improvement of the environment throughout the world and for the reliable and

balanced development of the world's communities" (UNESCO and Slovenian National Commission for UNESCO, 2022, 66).

The term *sustainable development* was *first* defined in its familiar interpretation ("development that meets the needs of the present without compromising the ability of future generations to meet their own needs") in 1987 in a report by the World Commission on Environment and Development, "Our Common Future", also known as the Brundtland Report. Since then, dozens of conferences and summits on sustainable development have taken place, including the 2005-2017 decade, which was declared the UN Decade of Education for Sustainable Development (DESD) to "mobilize hundreds of thousands of people to reorient education globally towards a central goal: learning to live and work sustainably". (ibid.) From DESD, the Global Programme of Action on Education for Sustainable Development (GPESD 2015-2019) has evolved, with the aim of providing and strengthening concrete action on education for sustainable development. The Incheon Declaration on Education, adopted in 2015, identified the following for the period up to 2030: "Our vision is to transform lives through education, recognizing the important role of education as a key for development and for achieving the other proposed Sustainable Development Goals set out in the 2030 Agenda" (ibid.). At the 40th session of the General Conference of UNESCO (as the United Nations specialised organisation for education, science and culture), the implementation framework for education and training for sustainable development beyond 2019, "VITR for 2030" (2020-2030), was adopted. UN General Assembly Resolution 74/223 "encouraged governments to strengthen efforts to systematically integrate and institutionalize ESD in the education sector and other relevant sectors" (ibid.), explicitly recognizing the role of ESD as an integral element of the Sustainable Development Goals (op. cit. Sustainability Goals).

It can be noted that international "pro-environment" efforts in the field of education have been going on for about 50 years, and that since 2015, the process of education has been recognised by the international political and professional community as a key factor in the quest for sustainability. The priority areas of "VITR for 2030" are as follows:

- integrating education for sustainability into global, regional, national and local policies,

- paying special attention to promoting an integrated institutional approach in education, ensuring that *we learn what we live and live what we learn*,
- empowering educators with the knowledge, skills, values and attitudes consistent with sustainability objectives,
- identifying young people as key actors in addressing sustainability challenges and systematically training them (including in various youth organisations) in VITR,
- promoting action in the local environment, underlining the importance of action in real-life settings. (UNESCO and Slovenian National Commission for UNESCO, 2022, 54)

We are becoming increasingly aware that international (and educational) efforts in various fields have not borne the fruit we would have liked or needed, despite their 50-year duration. This is evidenced, among other things, by the exponential rise in greenhouse gas levels (Flisar, 2021), which has contributed to the fact that the average global temperature of the planet has risen by over 1°C since the late 1800s (UNESCO and Slovenian National Commission for UNESCO, 2022), and Slovenia, given its geographical specificities, is warming even faster than the global average – a 2°C rise in average temperature (Umanotera, 2023), with most of the warming occurring in the last thirty-five years. The 2019 report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services warns that one million species are in danger of extinction and that these losses will have severe consequences for ecosystems and people (UNESCO and Slovenian National Commission for UNESCO, 2022). At the same time, the world's population (despite a decline in the average global fertility rate) continues to grow and is projected to reach around 11 billion by 2100 (Moustakerski, 2015), which naturally implies a greater consumption of natural resources due to human needs and activities, or that the exponential rate of unwanted change will Increase if the lifestyles of the (economically) developed world are maintained unchanged.

This implies that we inevitably need to adapt at the individual and societal level, and that this adaptation must be strongly supported by education as one of the fundamental systems of development. Stefania Giannini, Assistant Director-General for Education at UNESCO, highlights an important dilemma: "Increasingly, we are asking ourselves: is what we are learning really relevant to our lives, will it help us to

ensure the survival of our planet?". (UNESCO and Slovenian National Commission
for UNESCO, 2022,, 1). On the other hand, starting from the VITR 2030 priority
areas – are we really learning about what we are living, or are we living what and how
we are learning?

The dilemmas described above motivated us to focus in the present contribution on
one part of the geography education process, i.e., on the inclusion and didactic
evaluation of sustainability learning content in selected geography education
materials, i.e., textbooks and independent workbooks for geography in primary and
secondary schools.

2   Theoretical framework

For educational purposes, given the state of the planet and the processes that are
taking place, it makes sense to start by recording the substantive issue focal points
or related areas of educational potential, i.e., sustainability. In a generalised sense,
these are as follows:

   – the quest for quality of coexistence (challenged in various dimensions by
     population growth, resource scarcity, environmental migration and other
     migration that is more or less directly related);
   – the need to reduce consumption (efforts to develop a circular economy),
   – the need to control pollution of all kinds,
   – the need to protect habitats and living creatures. (adapted from
     Moustakerski, 2015)

While recognising the educational potential in the field of sustainability, it is also
important to define the target competences. The European Commission's
GreenComp (2022) document defined a European framework of competences for
sustainability as a common basis for learners, whatever their level of education, and
guidelines for educators for all learning environments (formal or informal), and
attempted to define by consensus what sustainability as a competence means. The
GreenComp framework consists of 12 competences grouped into four domains:

1. embodying the values of sustainability (valuing sustainability, supporting equity, promoting nature);
2. embracing complexity in sustainability (systems thinking, critical thinking, problem formulation);
3. imagining sustainable futures (future literacy, resilience, exploratory thinking);
4. action for sustainability (political engagement, collective action, individual initiative) (Bianchi et al., 2022, 2)

Alongside the diagnosis of educational needs, target content and competences, the question that drives the achievement of knowledge in the broadest sense is also crucial for educators: how to approach it in order to make the effort effective. The concepts of global and transformative learning have emerged in the field of education for sustainability, alongside an awareness of the cognitive processes, social, emotional and behavioural aspects of the individual and the group that need to be taken into account in a combined way in all kinds of education. Global learning is an umbrella concept that highlights a range of themes (awareness and knowledge of environmental challenges, support for a critical understanding of an interconnected world, support for the values of equality, equity, solidarity, justice, democracy, and the promotion of dialogue or the fight against stereotypes, hate speech and populism) that relate to the individual's role in society and emphasise his or her interdependence and involvement in global developments. The aim is to achieve active citizenship and to realise the vision of a model of partnership between peoples, cultures and religions at the micro and macro levels. (North-South Centre of the Council of Europe, 2019) Transformative learning (i.e., learning that achieves real change in the way people think and live) is a concept that has several interpretations, but in the context of sustainability, it relates directly to the question of how to achieve success in education for sustainability. This is achieved when learners "challenge the entrenched structures of Western ways of knowing, of being (e.g., extractivism, i.e., the belief that the Earth is our property and can be exploited without limit; speciesism, i.e., discrimination against other species; and unlimited growth)" (Košmerl&Mikulec, 2022, 22), and when "alternative visions of ways of being and knowing are foregrounded, in which we are all interrelated and interdependent" (ibid.). Thus, three phases are highlighted in the process of transformative learning for sustainability:

–   critical analysis of the current situation around the world,
–   a vision of possible alternatives to the currently dominant models of
    thinking and being,
–   implementing a process of change that will lead to responsible global
    citizenship. (UNESCO and Slovenian National Commission for UNESCO,
    2022)

The phases of transformative learning for sustainability are aligned at the core with
the GreenComp competency framework, highlighting three aspects: knowledge,
values and concrete action.

The system of geography education in Slovenia has always responded to societal
needs and related international efforts in the subject area. While in the first three
decades after 1950, geography education focused on learning about the Earth,
evaluating and analysing its potentials (natural resources), in the 1980s it shifted
towards awareness-raising and protection of the environment, and then, at the
beginning of the new millennium, towards efforts to ensure survival on the planet –
to "sustainable development". The mission of future geography education is
undoubtedly to strengthen awareness of the need to establish better relations
towards the environment/use of space, life forms and future generations
(sustainability). In this respect, the fundamental gnoseological or epistemological
essence of geography already corresponds to sustainable competences or
transformative learning for sustainability. Geography is an interdisciplinary and
complex science that aims to study the dynamic integration and interaction of natural
and social elements. Its conception, as presented graphically by the German
Geographical Society, is illustrated in Figure 1.

At the core of Geography is the 'human-environment system' as the central
underlying concept, the system components ('structure-function-process') and the
spatial levels as the basis for the concretization of concepts in the study of the
human-environment system (Deutsche Gesellschaft für Geographie, 2020, 11). The
presented concept of geographical science and the resulting geographic education is
built upon in relation to the idea of sustainability, and its graphic structure can
resemble the example of geography teaching in Germany (Figure 2) or be as
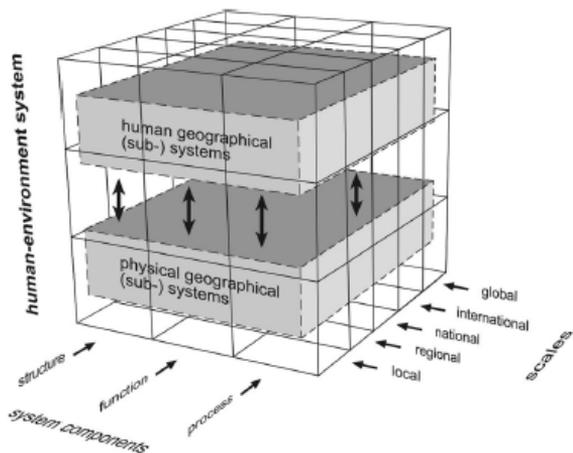structurally simplified as the example of geography teaching in Mexico (Figure 3).

Figure 1: Basic concepts of spatial analysis in Geography
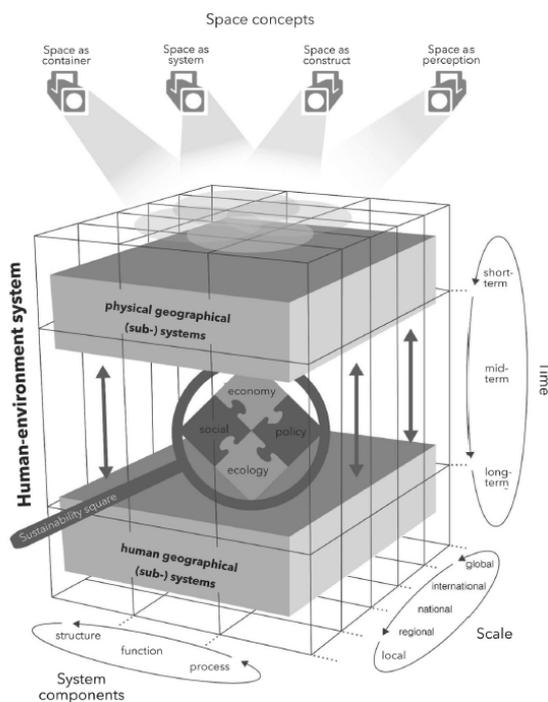Source: Bagoly-Simó, 2022, 56 (after DGfG (Deutsche Gesellschaft für Geographie), 2014, 11)

Figure 2: Concepts of spatial analysis in geography in Germany with explicit reference to the idea of sustainability
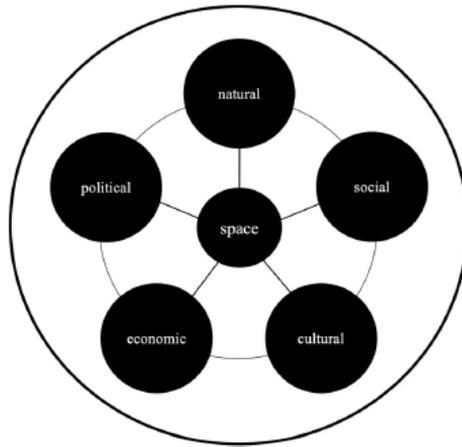Source: Bagoly-Simó, 2022, 57 (after Fögele, 2016, 73, amended)

Figure 3: Key concepts of geography in the Mexican education system.
Source: Bagoly-Simó, 2022, 58 (after SEP, 2011, p. 16, amended).

However the essence of Geography as a science is structurally realised in geography teaching and the idea of sustainability is integrated in different educational systems (in Slovenia, basically similar to Germany, combining a target-competence thematic and regional approach , while in Germany a competence-thematic approach prevails) (Klecker, 2023), the essential components of green competences and transformative learning for sustainability remain consistent with the conception of geographic science. The Lucerne Declaration (Haubrich, Reinfried, & Schleicher, Citation 2007) and the Declaration on Geographical Education for Sustainable Development (Haubrich, Reinfried, & Schleicher, Citation 2007) also recognize the connections between geographic science, geographic education and the fields of education for sustainability. (Haubrich, 2007; IGU-CGE, 2016; after Bagoly-Simó&Kriewaldt, 2022) Geography as a science promotes the understanding of complexity, in this context, critical analysis of the world situation, encourages the imagining of development alternatives, and through this, influences the development of values and responsible action in real life circumstances. As Bagoly-Simó (2022, 65) notes, geography teachers today, as in the 1990s (Haubrich, 1992), stress the unique contribution of geography to sustainability, but there is no better time than the present to critically re-evaluate the contribution of geography education and to work on a viable plan to contribute to the current major challenges facing humanity. The present study has been designed with this in mind.

In our study, when examining the integration and didactic evaluation of sustainability learning content in selected geography educational materials, i.e., textbooks and independent workbooks for geography in primary and secondary schools, we focused on the learning tasks, but not on the rest of the text and the illustrative-graphic representations in the textbooks and independent workbooks, insofar as these were not directly related to the learning tasks. We assumed that the learning tasks would be the most likely to show a variety of learning approaches. It was also important for us to start from the premise that textbooks and workbooks, as the main teaching aids, can be used to identify which topics, examples and learning tasks are present in the reality of geography lessons, and that these can also be used as a basis for inferring, in part, the didactic approaches in the actual delivery of the lessons. Textbooks reflect the expected knowledge of facts and skills that are perceived as important by the education system within a given society (Lipovšek, 2021 in Konečnik Kotnik&Kolnik, 2023).

The main objectives of the research are consequently related to the evaluation of (1) the quantity of representation and (2) the quality of the didactic diversity of learning tasks. In doing so, we included only those learning tasks that were *directly* linked to key aspects of sustainability. As we have already pointed out in this contribution, and we point to this in the following also, the structure and contents of geographical science and geographic education are basically integrally correlated with the contents of sustainability. Within the quantitative analysis, we compared the quantitative representation of sustainability-related geographical learning tasks, taking into account the following indicators:

- type of school,
- class,
- the number of learning tasks, i.e. questions or assignments for pupils related to sustainability.

The qualitative analysis of didactic diversity was carried out on the basis of indicators directly derived from the three dimensions of transformative learning for sustainability, or the four leading European green competences. These were as follows:

- critical analysis of the current situation worldwide (embracing complexity in sustainability),
- a vision of possible alternatives to the currently dominant models of thinking and living (imagining sustainable futures) ,
- implementing a process of change leading to responsible global citizenship (action for sustainability); and
- embodying the values of sustainability.

The assumption we have pursued here is that even if the number of learning tasks in a textbook or independent workbook is comparable or balanced in terms of the amount of information with other content, there is a more didactically relevant question. This involves the extent to which an otherwise maybe balanced number of learning tasks can also reflect the achievement of qualitative criteria, since information knowledge is not necessarily interconnected or inter-networked. i.e. in terms of developing diverse learning competences and thus also in terms of transferring learning knowledge into life practice or in terms of transformativeness (adapted from Konečnik Kotnik&Kolnik, 2023).

3   Methodology

In order to prepare the theoretical basis and the criteria for the empirical part of the research, we used the descriptive method of literature research review in the field of sustainability and geography education.

In the empirical section, we conducted a two-part, non-experimental empirical study. In the first part, we collected numerical data for selected geography textbooks and independent workbooks for primary and secondary schools by quantitative analysis according to the criteria presented in the theoretical framework. The data obtained were comparatively processed at the level of basic descriptive statistics. In the second part of the empirical research, we examined the data collected on the basis of descriptive criteria at the level of a broader interpretative qualitative analysis, focusing on the learning tasks for pupils according to the selected didactic elements. We began from the criteria presented in the theoretical framework of the paper, based on the concept of transformative learning for sustainability and on the European Green Competences.

The purpose of the research was to determine whether the learning tasks included in these learning materials enable students to develop and acquire a variety of learning skills that are consistent with the principle of sustainability. Based on this underlying purpose, we formulated the key research objectives and initial assumptions presented in the previous section. We further assumed that we would find a quantitatively higher representation of sustainability learning tasks in secondary school learning materials compared to primary school learning materials. In the qualitative analysis of the didactic diversity of sustainability learning content, we further assumed that the learning tasks, questions or assignments for pupils or students would unevenly develop all levels of transformative learning for sustainability, i.e., Green competences, with the first level, i.e., critical analysis of the current global situation (embracing complexity in sustainability), being the most represented, the second level of envisioning possible alternatives to the currently dominant models of thinking and living (imagining sustainable futures) being less represented, and the third and fourth levels (implementing a process of change leading to responsible global citizenship – acting for sustainability and embodying the values of sustainability) being significantly less represented.

3.1   Sample

In the study, we analysed seven current and approved textbooks for geography classes in all grades of secondary school, trying to have a fairly balanced coverage of textbooks from two publishers, which will be referred to as Publisher 1 and Publisher 2 in the discussion of the results. For the primary level, we analysed sixteen textbooks and independent workbooks for all grades where geography is taught, i.e. grades 6, 7, 8 and 9 (we have presented the quantitative data separately for textbooks and independent workbooks in the tables), and we have tried to achieve balanced coverage of the teaching materials from the same two publishing houses. For each publishing house, we have analysed eight sets of teaching material–four textbooks and four independent workbooks. Information on the textbooks and independent workbooks analysed can be found in the list of references and sources.

The results of the survey will be presented in two parts. In the first part, we will present the results of the quantitative analysis, and in the second part, the results of the qualitative analysis, each time separately for the primary and secondary levels of geography education.

4 Results with discussion

In the first part of the study, the quantitative representation of sustainability-related learning tasks in selected validated textbooks and independent workbooks for geography classes in primary and secondary schools was examined on the basis of set criteria. In so doing, we took into account the indicators already mentioned:

- − type of school,
- − class,
- − number of sustainability-related learning tasks.

In defining the sustainability orientation of the learning tasks, we have drawn on the theoretical frameworks outlined in the initial sections of this contribution. We considered revision, consolidation and other assignments as learning tasks, as well as the tasks included in the rubrics with additional challenges for pupils and students.

Table 1: Quantitative analysis of the learning tasks in selected primary school teaching materials from a sustainability perspective – Publisher 1

Class	Resources	Total No. of learning tasks	No. of learning tasks related to sustainable content	Share of learning tasks related to sustainability (%)
6th grade	textbook	48	1	2.08
	independent workbook	64	1	1.56
7th grade	textbook	122	10	8.20
	independent workbook	122	9	7.38
8th grade	textbook	123	15	12.20
	independent workbook	128	18	14.06
9th grade	textbook	107	11	10.28
	independent workbook	122	20	16.39
Total		**836**	**85**	**10.16**

Source: Author

Table 2: Quantitative analysis of learning tasks in selected primary school teaching materials from a sustainability perspective - Publisher 2

Class	Resources	Total No. of tasks	No. of learning tasks related to sustainable content	Share of learning tasks related to sustainability (%)
6th grade	textbook	129	1	0.78
	independent workbook	129	1	0.78
7th grade	textbook	137	18	13.14
	independent workbook	137	18	13.14
8th grade	textbook	127	13	10.24
	independent workbook	127	13	10.24
9th grade	textbook	114	14	12.28
	independent workbook	116	14	12.07
Total		**1016**	**92**	**9.05**

Source: Author

A quantitative analysis of the learning tasks in the selected primary school teaching materials showed that the representation of sustainability-directly related learning tasks is similar in the textbooks and independent workbooks from both publishers (Publisher 1 in a proportion of 10.16% of all learning tasks, and Publisher 2 in a proportion of 9.05% of all learning tasks), although the learning materials from the two publishers differ in terms of authorship, scope, illustrative and graphic material, content and didactic elements, and technical implementation. The sustainability-directly related learning tasks are represented differently by grade in these teaching materials. For both publishers, the lowest relative representation of such tasks was in the sixth grade, which is the grade with the lowest number of teaching hours in the primary school curriculum (Ministry of Education of the Republic of Slovenia, 2014). In the case of Publisher 1, the number of sustainability-oriented learning tasks in the teaching materials tends to increase by grade from grade 6, with an average of 1.8%, to grade 9, with an average of around 13%, while in the case of Publisher 2, the vertical quantitative gradation from grade 6 onwards is not constant, or rather, the proportion of sustainability-oriented tasks included is quite similar in grades 7, 8 and 9 (between 10 and 13% of all learning tasks).

Table 3: Quantitative analysis of learning tasks in selected secondary school teaching
materials from a sustainability perspective - Publisher 1

Class	Resources	Total No. of tasks	No. of learning tasks related to sustainable content	Share of learning tasks related to sustainability (%)
1st year	textbook	132	22	16.67
2nd year	textbook	78	13	16.67
3rd year	textbook	42	13	30.95
4th year	textbook	63	8	12.70
Total		315	56	17.8

Source: Author

In the case of the secondary school materials, although there are slightly higher differences in the representation of sustainability-directly related learning tasks between the two publishers, the representation of these learning tasks is similar in both publishers, at around one-fifth of the total, which is around 10% higher than for the primary school materials.

Table 4: Quantitative analysis of learning tasks in selected secondary school teaching
materials from a sustainability perspective - Publisher 2

Yearbook	Resources	Total No. of tasks	No. of learning tasks related to sustainable content	Share of learning tasks related to sustainability (%)
1st year	textbook	76	18	23.68
2nd year	textbook	59	11	18.64
3rd year	textbook	49	14	28.57
Total		184	43	22.4

Source: Author

No particular quantitative order can be discerned in the share distribution of the sustainability learning tasks across the years, but the absolute number of tasks considered is the highest in the first year, because the direct objectives of so called sustainable development are implicit in the curriculum of the first year of upper secondary school as a specific chapter (Polšak et.al., 2008).

Based on a comparative analysis of the representation of sustainability-related learning tasks in these teaching materials, it can be concluded that such tasks are more frequently represented in secondary school geography teaching materials (1/5 of all learning tasks) than in primary school geography teaching materials (1/10 of all learning tasks), with no significant differences between the two publishers within each educational level. We have shown that the content of sustainability is directly

identifiable in the learning tasks in the geography teaching materials.. It can be observed that sustainability-related content is included in the learning tasks in different content areas within geography, both in physical geographic topics and in socio-geographic topics, or is related to various spatial elements and their interconnection, including the spatial, environmental and social conflicts of these interconnections, which are addressed in the geography curricula through a thematic or regional approach. Although certain differences in the share of learning tasks with direct sustainable content can be detected by grade, these are not consistent, nor can they be justified from the point of view of content or from the point of view of the amount of hours devoted to the subject (in the latter case, the sixth grade of primary school may be an exception, in which the minimum number of teaching hours according to the primary school curriculum is dedicated to geography and where basic geographical content is discussed with an emphasis, such as orientation, cartography, the Earth as a whole, etc. (Kolnik et.al., 2011)). The learning tasks addressed relate to knowledge and evaluation of and planning for tackling pressing environmental issues, as well as economic and socio-economic issues. Among the identified sustainability-oriented learning tasks, the majority are directly related to environmental issues.

More didactically important than quantity is the question to what extent the number of pieces of information can reflect the achievement of qualitative criteria (Konečnik Kotnik&Kolnik, 2023). We will refer to this issue below. In the qualitative analysis, we included all the learning tasks that were also included in the quantitative analysis, this time without distinguishing between the two publishers, as we did not detect a marked difference between them on average in the quantitative analysis. The qualitative assessment aimed to determine the absolute situation concerning the inclination of these learning tasks towards the different elements or dimensions of transformative learning for sustainability or green competences in the geography learning materials at both educational levels. The qualitative analysis of didactic diversity was carried out on the basis of indicators directly derived from the three dimensions of transformative learning for sustainability or the four leading European green competences:

  – critical analysis of the current global situation (embracing complexity in sustainability),

- a vision of possible alternatives to the currently dominant models of thinking and living (imagining sustainable futures),
- implementing a process of change leading to responsible global citizenship (action for sustainability); and
- embodying the values of sustainability.

The absolute trend in the number of sustainable learning tasks, depending on which qualitative criterion they address, is shown in Figure 4 and Figure 5. It should be added that a single learning task can address one or more of the qualitative analysis criteria, which means that it could have been considered for more than one criterion.
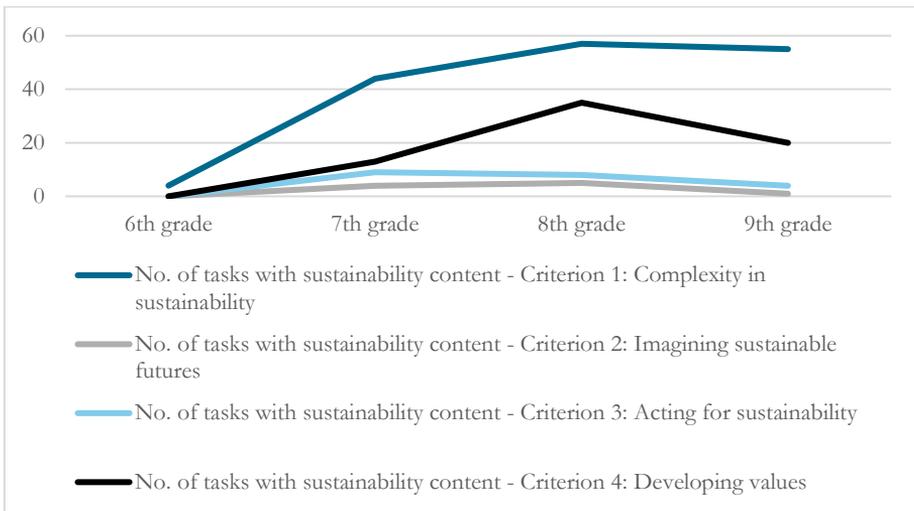

Figure 4: Absolute number of learning tasks according to the qualitative analysis criteria - primary school.
Source: Author.

A qualitative analysis of sustainability learning tasks in selected teaching materials for geography lessons in primary school showed that the most frequently represented learning tasks in all grades are those related to a critical analysis of the current situation in the world, which we believe is essentially overlapping or closely linked to the green competence of embracing complexity in sustainability. This is an expected consequence of the affinity of this criterion of qualitative analysis with the epistemological essence of geography (see also Bagoly-Simó, 2014, 2022; Chang&Kidman, 2018; Drozg, 2020; Maude, 2022; Rogelj et.al., 2023). Although in

geography education, we approach learning about the complex interconnectedness of spatial elements in a systematic and gradual way (one element is studied first, to which the next one is added, etc., until students can appreciate how spatial elements influence each other) (Brinovec, 2004), and this may at first sight appear to be a non-complex approach, it is nevertheless necessary to re-expose that, in fact, the whole design of the geography course supports the Green Competence considered. (Bianchi et.al., 2022) In the analysis, however, we have highlighted only those learning tasks that explicitly include a complex sustainability dimension. The second and third dimensions of transformative learning (criteria 2 and 3 of the qualitative analysis) are rarely represented in teaching tasks for primary school. This means that the learning tasks rarely refer to envisioning or seeking, or thinking about potential alternatives to currently prevailing models of thinking and living, and thus to anticipating future developments or imagining sustainable futures, and to concrete action, i.e., to actively implementing a process of change in the context of responsible global citizenship or to taking action for sustainability. In summary, the representation of all the identified criteria for qualitative analysis in the learning tasks is lowest in grade 6, when students are just learning about the basics of geography (Kolnik et.al., 2011), and highest in grade 8, when they are learning about the regional geography of the world (ibid.), before dropping slightly again in grade 9 when dealing with the geography of Slovenia (ibid.). The trend could be partly explained by the increasing age and receptiveness of pupils to more complex and problem-based thinking, and partly by the core content of the curriculum or even with the number of hours devoted to geography lessons each year, although maybe with the exception of the sixth grade, all the listed is not a relevant starting point (see also Scheyvens et.al., 2008; Healey&Roberts 2004), as the analysis for the secondary level also shows.
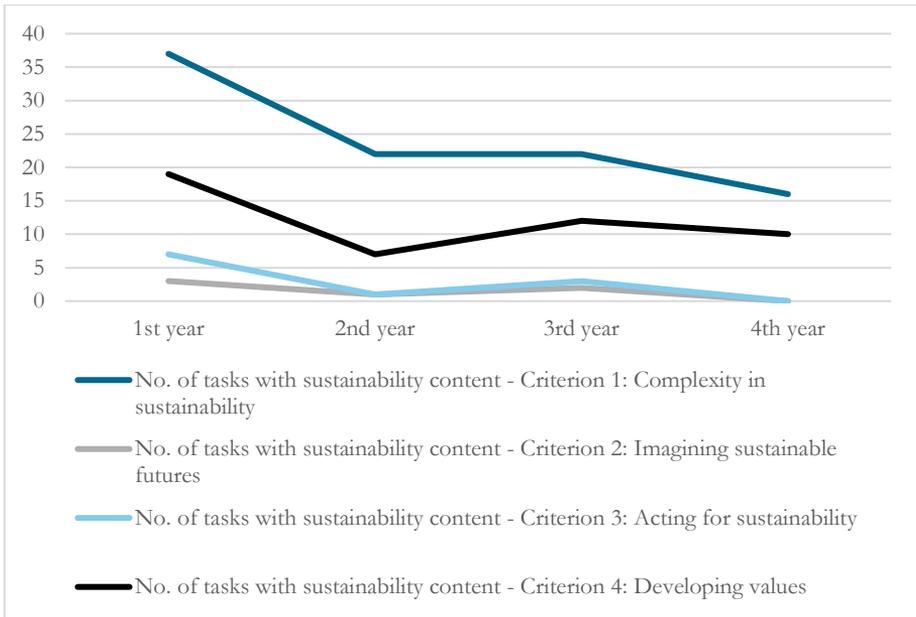
**Figure 5: Absolute number of learning tasks according to the qualitative analysis criteria -
secondary school.**
Source: Author.

In the case of the secondary school, as with the primary school, we included in the analysis all the learning tasks that we identified in the quantitative analysis process as related to the principle of sustainability. Since we did not have teaching materials for the fourth year from one of the publishers, we weighted the number of identified learning tasks that matched the qualitative analysis criteria for that year. Again, a single learning task can relate to one or more of the qualitative analysis criteria, so the same learning task can be considered for more than one criterion.

The qualitative analysis showed a similar situation regarding the quantitative representation of the qualitative analysis criteria in the learning tasks as in the primary school example. Critical analysis of the current world situation or the green competence of embracing complexity in sustainability dominates, while imagining sustainable futures and concrete action for sustainability are represented in very low numbers. Learning tasks in which we identified a direct reference to the development of values ranked second of all four criteria. The representation of the dimensions of learning for sustainability does not increase consistently with the year

or age of the students, but shows a summative decline between the first year (with the highest representation) and the fourth year. This may be because the objectives of sustainable development (sustainability) are also directly implicit in the curriculum of the first year of gymnasium as a specific chapter (Polšak et.al., 2008) and because geography is 'only' an optional subject in the fourth year leading to the final external exam (Matura) (Gaal et.al., 2022), but it would nevertheless make sense, as adolescents move into adulthood, to appeal morestrongly to their active citizenship in the broadest sense, especially when dealing with own country or local environment, as it applies to geographical subject in the fourth year of gymnasium (or the 9th grade of primary school) Although at primary school level we found the highest representation of the qualitative analysis criteria in the assignments for World Regional Geography, the situation at secondary school level does not coincide, with the highest representation of the criteria in the assignments for General Geography, followed by European Regional Geography and then World Regional Geography. Therefore, neither the general/thematic nor the regional approach is directly linked to the possibility of integrating sustainable content. (see also Scheyvens et.al., 2008)

A qualitative analysis of the learning tasks in the selected teaching materials for geography in primary and secondary school showed that they are dominated by aspects of transformative learning related to information literacy. Information knowledge is certainly basic, especially in the contemporary context where the public often draws simplistic conclusions and assumptions and exploits sustainability in various ways (greenwashing) (European Parlament, 2024). The lack of concrete action for sustainability, of implementing a process of change leading to responsible global citizenship, i.e., action for sustainability in the context of education, is a worrying aspect. A similar situation has been traced in other research (Konečnik Kotnik&Kolnik, 2023; Klecker, 2023; Scheyvens et.al., 2008).

5   Conclusion

In the Sustainability in Geographical Education study, we focused on a quantitative and qualitative analysis of learning tasks, directly connected to sustainability, in a sample of teaching materials, i.e., textbooks and independent workbooks for geography classes in primary and secondary schools. Although the study was limited to a sample of teaching materials and the latter have a limited (but usually high)

impact on real educational practice, some guidelines can be derived on the inclusiveness and didactic diversity of sustainability education in geography teaching.

A quantitative review of the sample of learning materials showed that we can confirm the assumption that the proportion of learning tasks that directly follow the principle of sustainability (in relation to the total number of learning tasks) is higher in secondary school learning materials compared to primary school learning materials. Since the question of the extent to which learning content/tasks meet the qualitative criteria in terms of transferability in terms of developing diverse geographical or general learning competences and thus also in terms of translating learning into life practice is more didactically relevant than quantity, a broader interpretative qualitative analysis of the didactic diversity of learning tasks was carried out. This confirmed the assumption that the learning tasks, questions or work assignments for pupils unevenly develop the levels of transformative learning for sustainability or green competences, with the first level, i.e., critical analysis of the current world situation (embracing complexity in sustainability), being the most represented in the learning tasks, followed by the fourth level of analysis, i.e. embodying the values of sustainability. The second level - visions of possible alternatives to the currently dominant models of thinking and living (imagining sustainable futures) and the third level (implementing a process of change that will lead to responsible global citizenship - action for sustainability) are the least represented.

In the curricular reform taking place in Slovenia, sustainability goals have become a cross-curricular content and are included in a meaningful context in all subjects of the educational vertical, both primary and secondary. This is a logical consequence of the importance of content for everyday and future life, which is also reflected in similar international educational trends (International Research in Geographical and Environmental Education, 2023). As we pointed out in the contribution, empirical studies also show that geography basically, in contrast to other subjects, has a strong conceptual and substantive connection with sustainability (Bagoly-Simó 2013, 2014). The results of our research showed, starting from a broader conceptual sense of sustainability, where these connections with existing geographic education in Slovenia are particularly strong and where they are weaker. Thus, teaching materials (textbooks, independent workbooks), which have a strong influence on real curricular practice, show, which is also confirmed by some findings from the

international arena, that teachers (as well as curricular documents such as syllabuses) are faced with a dilemma during the construction of a solid geographical knowledge and urgent measures - challenges related to sustainability that go beyond the role of mere mediators of this knowledge. (International Research in Geographical and Environmental Education, 2023). Certainly, a good measure of basic geographical knowledge (concepts of space, knowledge of the characteristics of places or geographical spaces of different hierarchical levels and sizes, interconnections of spatial elements, etc.) is necessary as a contribution not only to the understanding of geography, but also as a foundation for understanding sustainability (see also Maude 2022). It could be argued that the whole of geographical knowledge contributes to the latter, even if some of it is included in education gradually (e.g. by dealing with individual elements of space, such as the rock base, climate or population, one by one), which may seem - however, it is also a result of taking into account the didactic principles, such as the didactic principle of systematicity and gradualism - it does not always meet the criterion of the complex connection of these elements, which is an important category of sustainability. Within the entire spectrum of geographical knowledge, there are some aspects that are particularly directly related to sustainability, and we included them in our research. In addition to all geographic knowledge (learning objectives and contents), these aspects show that in the future (and also in the curricular reform underway in Slovenia) it is necessary to find an appropriate relationship between the amount of theory and facts (even if a solid measure of only these is necessary both for objective knowledge and, based on it, for the embodiment of values that lead to conduct) and active actions for sustainability, that is, by implementing the actual process of changes that will ultimately lead learners to responsible global citizenship. As Figure 6 shows, geographical education offers, indirectly and directly, many important opportunities for sustainable education and training of young people (from learning about the characteristics of places and geographical spaces, spatial, orientation and cartographic ingenuity, understanding of spatial structures or the interconnections between spatial elements and the functioning of spatial systems, to incentives for independent spatial research, spatial interpretations and, ultimately, active action in space), and in this context, it is necessary to give some of them more attention than is currently given to them due to the modern challenges of sustainability; even if partly at the expense of the now heavily represented. The left column of Figure 6 thus shows which of the listed emphases of geographical education are more emphasized in Slovenia today - circled, and which should be given more attention

in the current curricular reform compared to the past - circled in the right column of Figure 6.

TODAY	TOMORROW
1 stories about places and landscapes .... for wonder, a curious desire to explore diversity;	*1 stories about places and landscapes* .... for wonder, a curious desire to explore diversity;
2 fundamental cartographic and orientation ingenuity... to develop a spatial identity, to find one's way safely in a complex world;	*2 fundamental cartographic and orientation ingenuity*... to develop a spatial identity, to find one's way safely in a complex world;
3 understanding the structures and functioning of spatial systems ...to know, understand and respond responsibly to current issues in the world's landscapes;	*3 understanding the structures and functioning of spatial systems* ...to know, understand and respond responsibly to current issues in the world's landscapes;
4 developing skills for independent exploration of spatial systems...to balance outdoor movement and digital competence ;	*4 developing skills for independent exploration of* spatial systems...to balance outdoor movement and digital competence ;
5 developing spatial interpretation skills (geographic communication literacy)... for critical evaluation, accessible communication, interpretation and reasoning about spatial information;	*5 developing spatial interpretation skills* (geographical communication literacy)... for critical evaluation, accessible communication, interpretation and reasoning about spatial information;
6 encouraging active participation **in personal and social realities** (responsibility for place, people and self).	*6 encouraging active participation* **in personal and social realities** (responsibility towards place, people and self).

Figure 6: What does geography education in Slovenia offer young people today, and what more could it offer? (circled - emphasis on representation)
Source: adapted from Konečnik Kotnik, Kolnik 2023, 307.

The key here is also the question of understanding the relationship between deep and applied knowledge and active learning methods or pedagogy. It concerns three aspects of the latter: connecting everyday life and everyday knowledge with school knowledge and vice versa, practicing geography and debating/discussing the meaning of geography (see also Roberts, 2009). The revision of the curricula, which will be followed by the revision of the teaching materials, is an opportunity to strengthen the incentives for developing diverse competence for sustainability and especially emphasize responsible action in real life circumstances. Given these challenges, further research efforts are needed based on the questions below, including in support of curricular changes:

- What kind of transformative knowledge, with a focus on concrete activities in real life situations, can be offered to learners?
- Which contents should be eliminated from the (content-heavy) curricular materials (taking into account the hourly status of the subject in the existing curriculum) in order to create time and opportunity for transformative learning?
- How do different concepts of geographic education affect the success of transformative learning?
- What are the specific pedagogical and didactic approaches that best support transformative learning?
- What kind of empirical research will effectively support this transformative learning?
- How to check and evaluate the results of transformative learning?
- Do these results really support economic, environmental and social sustainability?
- Do future (and current) teachers have enough education and training that enable an optimal understanding of the content in approaches to convergence and awareness of the connection between different types of geographical knowledge and sustainability, so that they can confidently support young people in facing the climate and other challenges of living on the planet? (see also Bagoly-Simó&Kriewaldt, 2022; Chang&Kidman, 2018)

Equipping students, future teachers and current teachers of geography with geographical knowledge, which will be a solid and clear information base, as well as adequate for identifying more or less sustainable behavior, for predicting more suitable alternatives and for more sustainable real action, is definitely one of the outstanding important foundations of future geographical research and education. Only this should support young people well in the process of developing their personal values, which will lead to functioning in society.

Acknowledgements

Urška Borko, a student demonstrator in the second year of the second cycle of the two-subject pedagogical study programme at the Faculty of Arts, UM (2023/2024), participated in the analysis of the textbook materials.

References

Bagoly-Simó, P. (2013). Tracing sustainability: An international comparison of ESD implementation into lower secondary education. *Journal of Education for Sustainable Development*, *7*(1), 95–112.

Bagoly-Simó, P. (2014). Tracing sustainability: Concepts of sustainable development and education for sustainable development in lower secondary geography curricula of international selection. *International Research in Geographical and Environmental Education*, *23*(2), 126–141.

Bagoly-Simó, P. (2022). Geography's unkept promises of education for sustainable development (ESD) on geography's wasted potential to educate for a more sustainable future. *International Research in Geographical and Environmental Education, 32*(1), 53-68. DOI: 10.1080/10382046.2023.2158631

Bagoly-Simó, P., Kriewaldt, J. (2023) Future geography teachers for the planet. Powerful (disciplinary) knowledge and education for sustainable development (ESD) in initial teacher education (ITE), *International Research in Geographical and Environmental Education, 32*(1), 1-3, DOI: 10.1080/10382046.2023.2158622

Baloh, E., Lenart, B. (2021). *Geografija 6. Učbenik za geografijo v šestem razredu osnovne šole.* [*Geography 6*. Textbook for geography in the sixth grade of primary school.] Ljubljana: Mladinska knjiga Založba. 2. izdaja, 1. ponatis.

Baloh, E., Lenart, B. (2021). *Geografija 6*. Samostojni delovni zvezek za geografijo v šestem razredu osnovne šole.[*Geography 6*. Independent workbook for geography in the sixth gradeprimary schools.] Ljubljana: Mladinska knjiga Založba. 7. ponatis.

Baloh, E., Lenart, B., Stankovič, M. (2020). *Geografija 7. Učbenik za geografijo v sedmem razreduosnovne šole.*[*Geography 7*. A textbook for geography in the seventh gradeprimary schools.] Ljubljana: Mladinska knjiga Založba. 2. izdaja, 1. natis.

Baloh, E., Lenart, B., Stankovič, M. (2020). *Geografija 7*. Samostojni delovni zvezek za geografijov sedmem razredu osnovne šole.[*Geography 7*. Independent workbook for geographyin the seventh grade of elementary school.] Ljubljana: Mladinska knjiga Založba. 2. izdaja, 1. ponatis.

Baloh, E., Lenart, B., Stankovič, M. (2018). *Geografija 8*. Učbenik za geografijo v osmem razreduosnovne šole.[*Geography 8*. A textbook for geography in the eighth gradeprimary schools.] Ljubljana: Mladinska knjiga Založba. 1. ponatis.

Baloh, E., Lenart, B., Stankovič, M. (2021). *Geografija 8*. Samostojni delovni zvezek za geografijo v osmem razredu osnovne šole. [*Geography 8*. Independent Workbook for Geographyin the eighth grade of elementary school.] Ljubljana: Mladinska knjiga Založba. 6. ponatis.

Baloh, E., Lenart, B., Stankovič, M. (2021). *Geografija 9*. Učbenik za geografijo v devetem razredu osnovne šole.[*Geography 9*. A textbook for geography in the ninth gradeprimary schools.] Ljubljana: Mladinska knjiga Založba. 1. izdaja, 1. ponatis.

Baloh, E., Lenart, B., Stankovič, M. (2021). *Geografija 9*. Samostojni delovni zvezek za geografijo v devetem razredu osnovne šole. [*Geography 9*. Independent Workbook for Geographyin the ninth grade of primary school.] Ljubljana: Mladinska knjiga Založba. 5. ponatis.

Baloh, E., Petek, M., Repe, B., Stankovič, M. (2016). *Geografija 1*. Učbenik za geografijo v 1. letniku gimnazij in srednjih strokovnih šol.[*Geography 1*. Geography textbook in the 1st year gymnasiums and vocational secondary schools.] Ljubljana: Mladinska knjiga Založba. 1. natis.

Bianchi, G., Pisiotis, U., Cabrera M. (2022). *GreenComp*. Evropski okvir kompetenc za trajnostnost. JRC science for policy report.

Brinovec, S. (2004). *Kako poučevati geografijo: didaktika pouka.* [*How to teach geography: teaching didactics.*] Ljubljana: ZRSŠ.

Chang, C.H., Kidman, G. (2018) The future of education for sustainable development - where next after a decade of discourse?, International Research in Geographical and Environmental Education, 27:4, 281-282, DOI: 10.1080/10382046.2018.1511040

DGfG (Deutsche Gesellschaft für Geographie). (2014). *Educational standards in geography for the Intermediate School Certificate with sample assignments*. Berlin: DGfG.

Evropski parlament [European Parlament]. (2024). *Stop zelenemu zavajanju: kako EU ureja zelene trditve.* [*Stop green deception: how the EU regulates green claims.*] https://www.europarl.europa.eu/topics/sl/article/20240111STO16722/stop-zelenemu-zavajanju-kako-eu-ureja-zelene-trditve

Drozg, V. (2020). *Vpogled v socialno geografijo.* [*An insight into social geography.*] Maribor: Univerzitetna založba. Zbirka Prostori.

Flisar, N. (2021). *Paleopodnebne spremembe v Evropi: od pliocena do antropocena.* [*Paleoclimate change in Europe: from the Pliocene to the Anthropocene*] Magistrsko delo. Filozofska fakulteta Univerze v Mariboru.

Fögele, J. (2016). Entwicklung basiskonzeptionellen Verständnisses in geographischen

Lehrerfortbildungen: Rekonstruktive Typenbildung Relationale Prozessanalyse Responsive Evaluation. [Development of basic conceptual understanding in geographical areas Teacher training: Reconstructive type formation, relational process analysis, responsive evaluation.] *Geographiedidaktische Forschungen*, vol. 61. Münster: Monsenstein und Vannerdat.

Gaál, M, Kolarič, M., Mihačič, T., Nemec, L., Ogrin, M., Šeruga, I., Tršan, S., Vervega, V. (2022). *Predmetni izpitni katalog za splošno maturo – geografija.* [*Subject examination catalog for general matriculation – geography.*] Ljubljana: Državni izpitni center.

Haubrich, H. (1992). *International Charter on Geographical Education.* Nuremberg: HGD.

Haubrich, H., Reinfried, S., & Schleicher, Y. (2007). Lucerne declaration on geographical education for sustainable development. In S. Reinfried, Y. Schleicher & A. Rempfler (Eds.), *Geographical Views on Education for Sustainable Development* (pp. 243–250). Weingarten: HGD.

Healey, M., Roberts, J. (Eds) (2004) *Engaging Students in Active Learning: Case Studies in Geography, Environment and Related Disciplines.* Cheltenham: Geography Discipline Network and School of Environment, University of Gloucestershire.

IGU-CGE (2016). *International Charter on Geographical Education.* IGU-CGE. *International Research in Geographical and Environmental Education.* (2023). *32*(1), 1-3.

IPBES. (2019). *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (report).Klecker, T. (2023). *Primerjava kompetenčno naravnanih didaktičnih trendov pri pouku geografije med Nemčijo in Slovenijo.* [*Comparison of competence-oriented didactic trends in geography lessons between Germany and Slovenia*] Magistrsko delo. Filozofska fakulteta Univerze v Mariboru.

Kolenc Kolnik, K., Korže Vovk, A., Otič, M., Senegačnik, J. (2020). *Geografija Afrike in novega sveta.* Učbenik za 8. razred osnovne šole.[*Geography of Africa and the New World.* Textbook for the 8th grade of elementary school.] Ljubljana: Modrijan izobraževanje. 2. izdaja, 1. ponatis.

Kolenc Kolnik, K., Korže Vovk, A., Otič, M., Senegačnik, J. (2019). *Geografija Afrike in novega sveta.* Samostojni delovni zvezek za 8. razred osnovne šole.[*Geography of Africa and the New World.* Independent workbook for the 8th grade of primary school.] Ljubljana: Modrijan izobraževanje. 1. izdaja.

Kolnik, K., Otič, M., Cunder, K., Oršič, T., Lilek, D. (2011). *Program osnovna šola. Geografija. Učni načrt.* [*Elementary school program. Geography. Curriculum.*] Ljubljana: ZRSŠ.

Kolnik, K. (2020). *Didaktika geografija 1.* [*Didactics geography 1*] Študijsko gradivo (interno). Filozofska fakulteta Univerze v Mariboru.

Konečnik Kotnik, E., Kolnik, K. (2023). Učne vsebine o Dravskem polju v geografskih izobraževalnih gradivih. [Educational content about the Drava field region in geographical educational materials.] *Dravsko polje.* Prostori 6. Univerza v Mariboru. https://doi.org/10.18690/um.ff.11.2023.11

Košmerl, T., Mikulec, B. (2022). Izobraževanje odraslih za trajnostni razvoj v luči teorij transformativnega učenja. [Adult education for sustainable development in the light of transformative learning theories.] *Sodobna pedagogika*, let./vol. 73 (139), številka 2, 11–25.

Kušar, S., Natek, K., Ogrin, D. (2022). *Geografija Slovenije*. Učbenik za geografijo v 3. letniku gimnazij in srednjih strokovnih šol. [*Geography of Slovenia*. Geography textbook in the 3rd year of grammar schools and vocational secondary schools.] Ljubljana: Mladinska knjiga Založba. 1. natis.

Lipovšek, I. (2021). Koroška v slovenskih učbenikih.[Koroška in Slovenian textbooks.] Zbornik *Koroška. Od preteklosti do perspektiv*, str. 307–316. Zveza geografov Slovenije.

Maude, A. (2022). Using geography's conceptual ways of thinking to teach about sustainable development. *International Research in Geographical and Environmental Education, 32*(1), 4-19, DOI: 10.1080/10382046.2022.2079407

Ministrstvo za vzgojo in izobraževanje RS. [Ministry of Education of the Republic of Slovenia.] (2014). *Predmetnik osnovne šole*. [*Elementary school curriculum*] https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/Predmetnik-OS/Predmetnik-za-osnovno-solo.pdf

Moustakerski, L. (2015). *World population*. American Museum of Natural History. https://www.youtube.com/watch?v=PUwmA3Q0_OE

North-South Centre of the Council of Europe. (2019). *What is global Education?* https://www.youtube.com/watch?v=wdDMqVNkWEo

Paulin, A. (2007). *Tehniški metalurški slovar*. Ljubljana: Naravoslovnotehniška fakulteta. https://omp.zrc-sazu.si/zalozba/catalog/view/1650/6886/1654.

Petek, M., Stojilković, B., Stankovič, M. (2018). *Geografija 2*. Učbenik za geografijo v 2. letniku gimnazij in srednjih strokovnih šol. [*Geography 2*. Textbook for geography in the 2nd year of grammar schools and vocational secondary schools.] Ljubljana: Mladinska knjiga Založba. 1. natis.

Polšak, A., Dragoš, A., Resnik Planinc, T., Škof, U. (2008). *Učni načrt. Gimnazija. Geografija*. [*Curriculum. Gymnasium. Geography*.] Zavod RS za šolstvo. http://eportal.mss.edus.si/msswww/programi2010/programi/media/pdf/un_gimnazija/geografija_spl_gimn.pdf

Plut, D. (2002). Teoretični in terminološki vidiki koncepta trajnostnosti/sonaravnosti.[Theoretical and terminological aspects of the concept of trajnostnost/sustainability.] *Geografski vestnik*, 74-1, 73-86, ZRC SAZU.

Plut, D. (2005). Teoretična in vsebinska zasnova trajnostno sonaravnega napredka.[Theoretical and substantive design of sustainable, natural progress.] *Dela*, 35, 6-18, Oddelek za geografijo, Filozofska fakulteta Univerze v Ljubljani.

Roberts, M. (2009) Investigating geography, *Geography, 94*(3), 181-188, DOI: 10.1080/00167487.2009.12094268

Rogelj, B., Ogrin, D., Cigale, D., Vintar Mally, K., Miklič Cvek, L., Krevs, M., Frelih, M., Bobovnik, N. (2023). *Uvod v študij geografije*. [*Introduction to the study of geography*] Ljubljana: Založba Univerze v Ljubljani.

Scheyvens, R., Griffin, L.A., Jocoy, C.L., Liu, Y., Bradford, M. (2008). Experimenting with Active Learning in Geography: Dispelling the Myths that Perpetuate Resistance, *Journal of Geography in Higher Education, 32*(1), 51-69, DOI: 10.1080/03098260701731496

Senegačnik, J., Drobnjak, B. (2010). *Obča geografija za 1. letnik gimnazij*.[*General geography for the 1st year of high schools*.] Ljubljana: Modrijan založba. 9. izdaja.

Senegačnik, J. (2011). *Slovenija 1: geografija za 3. letnik gimnazij*. [*Slovenia 1: geography for the 3rd year of high school*.] Ljubljana: Modrijan založba. 3. izdaja.

Senegačnik, J. (2015). *Svet: geografija za 2. letnik gimnazij*. [*World: geography for the 2nd year of high schools*.] Ljubljana: Modrijan založba. 10., prenovljena izdaja, 3. natis.

Senegačnik, J. (2011). *Slovenija 2: geografija za 4. letnik gimnazij*. [*Slovenia 2: geography for he 4th year of high school*.] Ljubljana: Modrijan založba. 1. izdaja, 2. natis.

Senegačnik, J. (2021). *Moja prva geografija*. Učbenik za 6. razred osnovne šole. [*My first geography*. Textbook for the 6th grade of primary school.] Ljubljana: Modrijan izobraževanje. 8. izdaja, 1. ponatis.

Senegačnik, J. (2022). *Moja prva geografija.* Samostojni delovni zvezek za 6. razred osnovne šole. [*My first geography.* Independent workbook for the 6th grade of primary school] Ljubljana: Modrijan izobraževanje. 1. izdaja, 3. ponatis.

Senegačnik, J. (2009). *Geografija Evrope in Azije.* Učbenik za 7. razred osnovne šole. [*Geography of Europe and Asia.* Textbook for the 7th grade of primary school] Ljubljana: Modrijan izobraževanje. 1. izdaja.

Senegačnik, J. (2021). *Geografija Evrope in Azije.* Samostojni delovni zvezek za 7. razred osnovne šole. [*Geography of Europe and Asia.* Independent workbook for the 7th grade of primary school.] Ljubljana: Modrijan izobraževanje. 1. izdaja, 2. ponatis.

Senegačnik, J. (2019). *Geografija Slovenije.* Učbenik za 9. razred osnovne šole. [*Geography of Slovenia.* Textbook for the 9th grade of primary school.] Ljubljana: Modrijan izobraževanje. 2. izdaja.

Senegačnik, J. (2022). *Geografija Slovenije.* Samostojni delovni zvezek za 9. razred osnovne šole. [*Geography of Slovenia.* Independent workbook 357ort he 9th grade of primary school.] Ljubljana: Modrijan izobraževanje. 1. izdaja, 2. ponatis.

SEP. Secretaría de Educación Pública. (2011). *Programas de studio 2011/Guía para el Maestro Secundaria/Geografía de México y del Mundo* [*Curriculum 2011/Teachers' guide/Secondary education/Geography of Mexico and the world*]. México D.F.: SEP.

Umanotera. (2023). https://www.umanotera.org/publikacije/brosure-letaki/

UNESCO in Slovenska nacionalna komisija za UNESCO [UNESCO and Slovenian National Commission for UNESCO] (2022). *Vzgoja in izobraževanje za trajnostni razvoj. Kažipot.* [Education for Sustainable Development, A roadmap – ESD for 2030] ZRSŠ. www.zrss.si/pdf/VITR_za_2030.pdf

Vovk, A., Davidović, D. (2023). Trajnostnost in krožno gospodarstvo kot izobraževalna priložnost za geografe. [Sustainability and circular economy as an educational opportunity for geographers.] *Geografija v šoli*, 31-1, 9-18, ZRSŠ.

Werbach, A. (2011). Strategy for sustainability. Strategic Direction, 27, 10. http://doi.org/10.1108/sd.2011.0527jaa.013

Teachers' Perception of Environmental Crisis in Selected Slovenian Regions

Andreja Kozmus, Mateja Pšunder
University of Maribor, Faculty of Arts, Maribor, Slovenia
andreja.kozmus@um.si, mateja.psunder@um.si

Attention to the environmental agenda in Slovenia is growing in line with perceived environmental changes and is also being translated into school practice. Teachers are particularly important in educating about and raising awareness of the environmental crisis among young people. Within the framework of the ZELEN.KOM project, among other activities and with multiple respondents, we have identified 204 sets of perceptions of the environmental crisis among teachers, including their concerns about it, and the extent to which they are willing to be educated about it. We were interested in the differences between teachers according to individual variables (gender, age, place of residence and level of education). We found that teachers recognise and are very concerned about environmental issues in Slovenia; overall, there are no significant differences in their responses to the individual variables. In future it would be worthwhile to explore the transition from teachers' declared views on the environmental crisis to their active, sustainable action.

University of Maribor Press

Zaznavanje okoljske krize med učitelji v izbranih regijah Slovenije

Andreja Kozmus, Mateja Pšunder
Univerza v Mariboru, Filozofska fakulteta, Maribor, Slovenija
andreja.kozmus@um.si, mateja.psunder@um.si

Pozornost do okoljske krize v Sloveniji narašča skladno z zaznanimi okoljskimi spremembami, kar se prenaša tudi v šolsko prakso. Pri izobraževanju in ozaveščanju mladih o okoljski krizi so še posebej pomembni učitelji. V okviru projekta ZELEN.KOM smo med drugimi aktivnostmi in različnimi anketiranci ugotavljali, kako okoljsko krizo zaznavajo 204 učitelji, njihovo zaskrbljenost zaradi okoljske krize in v kolikšni meri so se na področju okoljske krize pripravljeni izobraževati. V vsem navedenem so nas zanimale razlike med učitelji glede na posamezne spremenljivke (spol, starost, kraj bivanja in stopnja izobraževanja). Ugotovili smo, da učitelji prepoznavajo okoljsko problematiko v Sloveniji, ta jih zelo skrbi, v njihovih odgovorih glede na posamezne spremenljivke pa v glavnem ne obstajajo statistično pomembne razlike. Ugotavljamo, da bi bilo v prihodnjih raziskavah smiselno pozornost nameniti preučevanju prehoda od deklarativnih stališč učiteljev o okoljski krizi do njihovega aktivnega trajnostnega delovanja.

1   Introduction

Attention to the environmental agenda is growing in line with perceived environmental changes, which in Slovenia have been most visible in recent years in the public's perception of more frequent natural disasters. The global environmental crisis does not manifest as an isolated issue but is intertwined with other global problems, e.g., energy, the economy, and equity crises, all requiring that people learn to adapt and transform (Lerch, 2017).

In 2015 the United Nations defined 17 sustainable development goals (SDG's) (UN, 2015), where sustainable development was explained as meeting human needs worldwide while simultaneously not endangering the ability of future generations to meet their future needs (WCED, 1987). The 2023 SDG Summit highlighted the transformative and accelerated actions leading up to 2030 and towards these SDG's (UN, 2023), by balancing economic, environmental, and social factors. Two concepts; sustainable development and sustainability are often used as synonyms; however, it is impossible to talk about further economic growth and environmental sustainability in a limited planet (Redclift, 2006); therefore, new environmental approaches are needed. Some authors (Kallis, 2011; Kothari, Demaria, & Acosta, 2014) suggest that we need to develop a new vision that is not linked to growth and that environmental sustainability will yield only economic decline, with our objective to make it socially sustainable. Ruggerio (2021) understands sustainability as a principle and sustainable development as a social process based on sustainable choices and decisions in various areas of social life, including education. Among global issues, teachers have a responsibility to continually seek ways to promote environmental sustainability in learning, teaching, and the management of educational institutions (UN, 2015). In other words: teachers' (environmental) awareness, and knowledge, and their application constitute essential steps in protecting the environment.

Teachers represent an important stakeholder in educating students for sustainable action, fostering harmonious coexistence, and constructing a fairer society. From the perspective of Peček Čuk & Lesar (2020,) teachers play two central roles. The first one refers to setting an example or being a role model for the students, and the second to their leadership or guidance in the pedagogical process. At the time of entry into primary school, children usually make the transition from imaginary to

symbolic identification. One object of identification can be the teacher. As leaders and guides in the educational process, teachers have autonomy to decide about the content and methods of teaching (Eurydice, 2008). According to Kroflič, teachers in both roles establish the authority of the superior pole. Namely, teachers' pedagogical authority can be interpreted in line with its predominant a) substantial or b) dialogical origin, which also interrelate. The first one can be recognised in the personal (teacher's personality traits) or social (teacher's social power) substantial, the second one in the relational connection between the teacher and the group of learners (different educational styles), or between the teacher and each individual student (the establishment and building of a relationship).

The dialogical perspective therefore posits that effective communication hinges on relationships where the primary purpose is the reciprocal acknowledgment of both superior and subordinate authority positions (Kroflič, 2010). A dialogical perspective can be linked to transformative learning (in comparison with transmissive learning), which is a dynamic process wherein pre-existing (uncritically embraced) ideas, beliefs, values, or attitudes are confronted and replaced with new ones that offer increased validity for the individual. This transformative shift occurs as patterns of thinking undergo a fundamental change (Novak, 2006; Kitchenham, 2008). Over the years, transformative learning has undergone many improvements. Marentič Požarnik (2000) calls it innovative learning, which is anticipatory (based on foresight about the future) and participatory (since it presupposes the democratic participation of all those affected by future decisions). Here, learning is conceived as a qualitative process of progressive enhancement, creating meaning-making and deeper understanding, and thus of changing oneself as a person, as opposed to a transmissive transfer of knowledge, where focus lies on content and a quantitative accumulation of information. Teacher (professional) autonomy is a prerequisite for the development of innovation and creativity in schools, but greater autonomy is closely linked to greater responsibility (Eurydice, 2008). Blake et al. (2013) distinguishes between the transmission of knowledge from teacher to learner, which is still (too) common in formal education, metacognitive learning, where young people learn to look at and critically evaluate their assumptions, beliefs, norms and values from a distance, and epistemological, transformative learning, where the individual's perception of the world and their participatory agency is changed (Blake et al., 2013).

Education for sustainability is closely intertwined with education for human rights, social justice, environmental protection etcetera. University teachers in particular are recognised as agents of change in the training of future teachers to become capable of addressing environmental problems (UN, 2015). A key element in realizing this objective is the advancement of novel learning and teaching approaches, requiring simultaneous investment in the ongoing professional development of educators and school leaders. Additionally, it entails the establishment of environmentally sustainable learning environments and school ecosystems, as emphasized by UNESCO (2021). This requires from all of us interrelated knowledge, skills, values, and attitudes, concerning the environment, economy, peoples' health, and welfare (Stanišić, 2016).

2 Empirical study

2.1 Research method

Our study is based on the descriptive and causal non-experimental method of empirical pedagogical research.

2.2 Aim of the empirical research

In this paper, we present only part of the results of a larger survey on the environmental crisis, which was carried out within the framework of the ZELEN.KOM project.

The main research question in this paper is how teachers perceive environmental problems. We assumed that teachers' perceptions of the environmental crisis were not irrelevant, as teachers are objects of identification for students and the leaders of and guides to the pedagogical process (Peček Čuk, & Lesar, 2020), which is discussed in more detail in the theoretical part of the paper. In more detail we were interested in addressing the following questions:

- How do teachers perceive the problem of individual environmental issues in Slovenia?
- How do teachers perceive the responsibility of individual stakeholders in the environmental crisis?

– What is the general concern of teachers about environmental problems and individual environmental issues?
– How do teachers perceive the consequences of the environmental crisis?
– To what extent are teachers willing to be educated about the environmental crisis?

In all these questions we were interested in differences between teachers according to gender, age, level of education (primary/ secondary school) and place of residence.

2.3   Research sample

The data was collected through an online anonymous survey questionnaire designed for the project by a research team composed of experts at the Faculty of Arts, University of Maribor, from different research fields. The questionnaire was sent by email to employers in the economic and non-economic sectors and to students. Employees in the business and non-business sectors from the regions of Pomurska, Podravska, Koroška, Savinjska, Zasavska, and Spodnjeposavska, were addressed by project participants and asked for cooperation. These regions were included because most students and university employees originate from these regions. The survey for economic and non-economic sectors was available online and in hard copy from 9. 2. 2023. As we wanted to show some concrete commitment to our project, €0.5 from each completed survey was donated to the Association for Birdwatching and Bird Studies of Slovenia, Pomurje Section (DOPPS-Pomurje Section).

The survey is based on an ad hoc sample. Two hundred and four teachers completed the questionnaire in the total sample covered by the survey. The gender of 202 teachers was given, of whom, as expected, in line with the feminisation of the teaching profession, there were more female teachers (170 or 84.2%) than male teachers (32 or 15.8%). The age of 198 teachers was given, which was classified into four groups: up to 30 years (19 or 9.6%), 31 to 40 years (46 or 23.2%), 41 to 50 years (65 or 32.8%) and 51 years and over (68 or 34.3%). In terms of level of teaching, there were slightly more teachers working in primary schools (116 or 56.9%) than in secondary schools (88 or 43.1%). The highest percentage of teachers (110 or 53.9%) said they lived in a village, followed by teachers living in a small town (52 or 25.5%),

teachers living in a suburban settlement (22 or 10.8), and the lowest percentage of teachers living in a large city with more than 30,000 inhabitants (20 or 9.8).

2.4   Measurement tool

In the framework of the ZELEN.KOM project, various research tools, such as surveys, interviews, analyses of company and institution documentation, and expressions of viewpoints in the media, have been and will continue to be employed for exploration and analysis within the project. This approach allows us to engage with various sectors, including industry, agriculture, tourism, public administration, teachers, and students in certain university programs at the University of Maribor. The questionnaire was made jointly by representatives from 10 departments of the Faculty of Arts, University of Maribor.

The data was collected through an anonymous online questionnaire designed for the project by a research team composed of experts from different research fields. In the following, we describe only those questions that are relevant for the purposes of this paper. First, some basic demographic data (gender, age, teaching level, type of settlement of residence and others) were obtained from the teachers. To find out how teachers perceived the problem of individual environmental issues in Slovenia, we offered them six statements (see Table 1), to which they responded on a five-point rating scale ranging from 1 - not problematic at all to 5 - very problematic. Perceptions of the responsibility of individual stakeholders in the environmental crisis were obtained by providing teachers with six answers and asking them to choose the most relevant one for them: it is mainly the responsibility of humans; it is caused equally by humans and natural processes; it is mainly caused by natural processes in the environment; none of these because the climate crisis does not exist; I don't know; and others. Teachers expressed their general concern about environmental problems by stating the following on a five-point scale from 1 - disagree to 5 - strongly agree that environmental problems worry me. They expressed their concern about individual environmental issues by addressing the five items (shown in Table 2) on a five-point scale from 1 - not at all concerned to 5 - very concerned. The next question was designed in a similar way to find out how teachers perceived the consequences of the environmental crisis. Teachers addressed three statements on a five-point scale from 1 - not agree at all to 5 – strongly agree. They indicated their willingness to be educated about the environmental crisis on a

five-point scale from 1 - not at all willing to be educated to 5 - very willing to be educated.

2.5   Data collection and analysis procedure

The questionnaire was published on the website https://www.1ka.si/ and was active from 9. 2. 2023 to 21. 3. 2023. The link to the questionnaire was sent to institutions with different sectors of activity (primary, secondary, tertiary, and quaternary). The content of the survey was explained to the contact persons in the selected institutions. We asked them to forward the link to the questionnaire to their staff and encourage them to complete it. Employee participation in the survey was voluntary and anonymous.

The collected data was analysed with the statistical analysis software SPSS and by suitable multivariate statistical methods at the level of descriptive and inferential statistics. When analysing data, we used various statistical proceedings: frequency distribution (f, f %), χ2-test (in places where frequencies were low Likelihood Ratio), the Mann-Whitney test and the Kruskal-Walli's test. In the following, we only provide calculations for cases where statistically significant differences or tendency were found.

3   Results

3.1   Perceived problem of individual environmental issues in Slovenia

We were interested in teachers' perceptions of the problem of individual environmental issues in Slovenia. The data are shown in Table 1.

From the mean values shown in Table 1, we can see that among the environmental issues mentioned, teachers ranked the quality of drinking water as the least problematic in Slovenia, followed by air quality. These are the only two environmental issues that scored a mean of less than 3. All other environmental issues scored more than 3, which means that teachers perceive them as problematic. Among these, teachers consider the destruction of nature to be the most problematic, followed by environmental pollution from waste, climate change and loss of biodiversity.

Table 1: Measures of descriptive statistics and percentage frequencies of perceived problem of individual environmental issues in Slovenia

Perceived problem	N	M	SD	(1)	(2)	(3)	(4)	(5)
air quality.	204	2.99	0.893	5.4	20.1	48.5	22.1	3.9
drinking water quality.	204	2.75	1.016	10.3	31.9	33.8	20.1	3.9
climate change.	204	3.34	0.930	3.9	10.8	42.2	33.8	9.3
waste pollution.	203	3.51	0.982	2	12.7	33.8	34.3	16.7
loss of biodiversity (species extinction).	204	3.26	0.951	3.9	15.2	39.7	32.8	8.3
destruction of nature (development of fertile land. deforestation).	204	3.57	1.055	2.9	12.7	29.9	32.8	21.6

Legend: N - number of responses, M - arithmetic mean, SD - standard deviation, (1) - Not at all problematic, (5) - Very problematic.

The percentages shown in Table 1 indicate that teachers are most likely to be undecided on all but two environmental issues (waste pollution and destruction of nature). They are most undecided about air quality. The most extreme responses in the positive direction (not at all problematic) are found for drinking water quality and in the negative direction (very problematic) for destruction of nature and waste pollution.

We wanted to know whether there were differences in teachers' responses by gender, age, level of education and place of residence. There was no statistically significant difference in teachers' responses by age, place of residence and level of teaching for any of the environmental issues. There is a tendency ($U = 5855.000$; $p = 0.056$) for teachers in secondary school ($M = 111.03$) to rate climate change as more problematic than teachers in primary school ($M = 96.03$). Only one individual environmental issue showed a statistically significant difference in teacher responses by gender, namely the destruction of nature ($U = 1818.500$; $p = 0.002$), which is considered more problematic by female teachers ($M = 106.80$) than by male teachers ($M = 73.33$). A tendency is observed for two individual environmental issues, climate change ($U = 2173.000$; $p = 0.055$) and biodiversity loss ($U = 2174.000$; $p = 0.057$), to be perceived as more problematic by female teachers ($M = 104.71$ and 104.71) than by male teachers ($M = 84.41$ and 84.44).

3.2   Perceived responsibility of individual stakeholders for the environmental crisis

Next, we wanted to know whether teachers believed in the existence of an environmental crisis and, if so, who or what they think is responsible for it. Not all teachers answered this question (n = 187). More than two-thirds of teachers (70.1%) believe that there exists an environmental crisis and that humans are primarily responsible for it. Just under a third of teachers surveyed (25.7%) believe that the environmental crisis is caused equally by humans and natural processes. The remaining answers are sparsely represented: only two teachers (1.1%) think that the crisis is mainly caused by natural processes in the environment, two teachers (1.1%) think that there is no climate crisis, and one teacher (0.5%) chose the answer "I don't know". Three respondents (1.6%) chose the answer "Other" and wrote down their opinion. Two pointed out that the weather is being made or deliberately changed, and one wrote that the biggest corporations in the world are to blame for the existence of the crisis.

The chi-square calculations showed no statistical difference between teachers' answers according to gender (X^2 = 7.027, df = 5, p = .219), age (X^2 = 12.228, df = 15, p = .662), school level (X^2 = 3.292, df = 5, p = .655), and place of residence (X^2 = 19.082, df = 15, p = .210).

3.3   Perceived general concerns about environmental problems and concerns about individual environmental issues

In the previous question, most teachers confirmed that they perceived an environmental crisis, so we next wanted to know how concerned they were about environmental problems in general and about individual environmental issues.

Teachers expressed their concern about environmental problems by responding to "I am concerned about environmental problems" on a five-point scale from 1 - disagree to 5 - strongly agree. The mean score of the statement is 4.06 (SD = 0.939), indicating that teachers are quite concerned about environmental problems. Of the 203 teachers who answered this question, 38.4% agree and about the same proportion (37.9%) even strongly agree that they are concerned about environmental problems. 17.2% expressed neither a positive nor a negative view of

the statement. Only a small percentage of teachers disagree (4.9%) or strongly disagree (1.5%) that they are concerned about environmental problems.

We were interested to see whether there was a statistically significant difference in teachers' responses by gender, age, level of teaching and place of residence. The chi-square calculations showed no statistical difference between teachers' answers according to age, school level and place of residence. There was a difference in teachers' answers according to gender ($X^2 = 10.821$, df = 4, p = .029), with female teachers expressing more general concern about environmental problems than male teachers.

Next, we were interested in how concerned teachers were about individual environmental issues. The results are shown in Table 2.

Table 2: Measures of descriptive statistics and frequency table for statements related to teachers' concerns about individual environmental issues.

To what extent are you concerned about…	N	M	SD	(1)	(2)	(3)	(4)	(5)
pollution of the environment.	203	4.27	0.856	1.0	2.5	13.3	35.0	48.3
more and more natural disasters.	203	4.05	0.958	2.0	4.4	18.2	37.4	37.9
rising global temperatures.	204	3.90	1.012	2.9	5.4	22.5	36.8	32.4
climate crisis.	204	3.99	1.022	2.9	4.4	21.6	32.8	38.2
extinction of plant and animal species.	204	4.04	0.987	2.0	4.9	20.1	33.3	39.7

Legend: N - number of responses, M - arithmetic mean, SD - standard deviation, (1) - Not at all worried, 5 - Very worried.

The mean values for all statement in Table 2 are around 4, which means that teachers' answers tend to indicate a high level of concern about individual environmental issues. They are most concerned about pollution, and only slightly less concerned about the increasing number of natural disasters and the extinction of plant and animal species. Among the environmental issues mentioned, the climate crisis and the rise in global temperatures are the least of their concerns, but it should not be ignored that these two environmental issues are also still of considerable concern (M = 3.90 and 3.99).

The following environmental issues showed statistically significant differences in teachers' responses by gender: environmental pollution (U = 1793.00; p = 0.001), increasing natural disasters (U = 1839.00; p = 0.002), climate crisis (U = 2052.500; p = 0.020) and extinction of flora and fauna (U = 1901.00; p = 0.004). For all these individual environmental issues, female teachers (M for the above statements: 106.39; 106.12; 105.43 and 106.32, respectively) express greater concern than male teachers (M for the above statements: 72.53; 73.97; 80.64 and 75.91, respectively). There is a tendency (U = 2162.500; p = 0.053) concerning the rise in global temperature, which is of greater concern to female teachers (M = 134.78) than to male teachers (M = 84.08). There is no statistically significant difference in the teachers' responses with respect to age, level of teaching and place of residence for any of the environmental issues.

3.4   Perceived consequences of the environmental crisis

We looked at teachers' perceptions of the consequences of the environmental crisis, with a particular focus on whether they perceived the consequences of the environmental crisis as more likely to affect them personally or the next generation. The answers are shown in Table 3.

Table 3: Measures of descriptive statistics and frequency table for statements related to the perception of the consequences of the environmental crisis

Statement	N	M	SD	(1)	(2)	(3)	(4)	(5)
Pollution harms my health.	204	4.27	0.954	2.0	3.4	13.2	27.9	53.4
Environmental problems affect my life.	204	4.06	0.991	1.5	6.9	16.7	34.3	40.7
Environmental problems are a threat to my children's future.	204	4.41	0.828	0.5	3.4	8.8	29.4	57.8

Legend: N - number of responses, M - arithmetic mean, SD - standard deviation, (1) - Disagree, (5) – Strongly agree.

All the statements had a high mean value, above 4. The mean values show that teachers are most concerned about environmental problems because they pose a threat to children's futures, but they also perceive the adverse impact of pollution on their health and the impact of environmental problems on their lives. Looking at

the percentages in Table 3, we see that teachers strongly agreed with all the statements; for all statements, the most frequent answer was "Strongly agree".

The calculation showed that there was a statistically significant difference in teachers' responses by gender for the statement "Environmental problems pose a threat to children's future" (U = 1919.500; p = 0.003). Female teachers (M = 106.21) were more likely to agree with this statement than male teachers (M = 76.48). For the other two statements, there was no statistically significant difference in the responses by gender. For the statement "Environmental problems affect my life", there was a tendency (U = 2189.000; p = 0.063) for female teachers (M = 104.62) to agree with this statement more than male teachers (M = 84.91). There is no statistically significant difference in teachers' responses to these statements by age, teaching level and place of residence.

3.5 Willingness to be educated about the environmental crisis

Given that teachers expressed considerable concern about the environmental crisis, but also overwhelmingly pointed out that the environmental crisis is mainly the responsibility of human beings, we were interested in the extent to which they were willing to educate themselves about the environmental crisis. Of the 183 teachers who answered this question, the majority (60.7%) said they were willing to educate themselves, while 14.8% said they were even very willing to educate themselves. Only 3.3% of teachers answered that they were unwilling to be trained. Approximately one fifth (21.3%) of teachers were undecided.

Again, we tested whether there were statistically significant differences in teachers' answers for each variable. In the calculation, we grouped the responses into three categories: unwilling to be educated, undecided, and willing to be educated (grouped responses for "I am willing to be educated" and "I am very willing to be educated"). There was no statistically significant difference in the teachers' responses regarding any of the variables studied. There was a tendency (X^2 = 12, 278, df = 6, p =.56) for the age group 30-39 years to be the most willing to be educated in the field of the environmental crisis (87.8%; 2.5% of this group declared themselves unwilling to be educated, 9.8% were unspecified), followed by the age group up to 30 years (76.5%; 23.5% of this group answered unwilling to be educated, 9.8% were unspecified), teachers aged 41-50 (78.9%; 5.3% were unwilling to be trained and 33.8% were

undecided), and those aged 50+ (63.1%; 3.3% were unwilling to be trained and 33.8% were undecided).

4   Discussion and conclusions

The main purpose of this paper was to present some results of a larger survey carried out within the framework of the ZELEN.KOM project. In this paper we focus on teachers and their perceptions of the environmental crisis. Below we highlight some of the most important findings of this study.

The survey shows that among the environmental issues discussed, teachers perceive the destruction of the natural environment as the most problematic, followed by waste pollution, climate change and biodiversity loss. Teachers ranked the quality of drinking water as the least problematic issue. It should be recalled that in Slovenia the right to drinking water is enshrined in the Constitution, in Article 70a (URS, 2016; UL 75/16), which states that everyone has the right to drinking water and that water resources are a public good managed by the State. Perhaps these answers can be linked to the latter.

A good two-thirds of teachers believe that there is an environmental crisis, and that people are mainly responsible for it. Just under a third of the teachers surveyed believe that the environmental crisis is caused equally by humans and natural processes, and only two teachers surveyed do not believe that there is an environmental crisis. These results are in line with those of other researchers (Milfont, 2010; Climate Change: Evidence & Causes, 2020; UN, 2023), which also confirm that humans are responsible for climate change.

A good three-quarters of teachers admitted to being concerned about environmental problems, with about half of them saying they were even very concerned about environmental problems. According to a survey (Pew Research Center, 2022) conducted among 24,525 adults in 19 nations, among the many threats facing the globe, climate change stands out as an especially strong concern among citizens in advanced economies. 75% of participants across 19 countries in North America, Europe and the Asia-Pacific region label global climate change as a major threat. In our study looking at teachers' concern about specific environmental issues, teachers are most concerned about pollution, and only slightly less concerned about

increasing natural disasters and the extinction of flora and fauna. Among the individual aspects, the climate crisis and the rise in global temperatures are the least of their concerns, but it cannot be ignored that teachers' concern about these aspects of the environmental crisis is also quite high. The findings of previous research (Cavolla et al., 2023) revealed a noteworthy and positive impact of participants' pro-environmental attitudes on their actual pro-environmental behaviours. In this paper, we did not check whether this high level of concern among teachers about environmental issues means that they trying to behave in a manner as environmentally friendly as possible. The latter, i.e. how the transition from declarative attitudes about the environmental crisis to active sustainable action is manifested, should certainly be examined, and presented in a future publication.

Teachers are most concerned about environmental problems because they pose a threat to children's futures, but teachers are simultaneously aware that environmental pollution also affects their health, and environmental problems affect their lives. These answers show that teachers are also concerned about the long-term consequences of the environmental crisis, which has also been confirmed by another study (Reckien, & Petkova, 2018).

SDG 4 of the 2030 Agenda (UN, 2023) aims to deliver comprehensive education to every adolescent, ensuring that all students gain the knowledge and competences essential for fostering sustainable development. Among almost 60,000 teachers surveyed (UNESCO, 2021), most of them (95%) were aware of the importance and motivated to teach students about the severity of environmental changes, but only a third feel they can explain these issues well to their students.

It is encouraging that 60% of teachers in our research are willing to be educated about the environmental crisis and about 15% are even very willing to be educated. It would be interesting to explore the ways in which they are willing to be educated - in the form of lectures, workshops, or perhaps self-education. According to Demirkaya et al. (2020,) ecology-based environmental education contributed positively to teachers views towards national parks, e. g. We can conclude that, with the knowledge gained in our project ZELEN.KOM, university teachers can contribute to student views on the environmental crisis.

The results showed mainly no differences between teachers according to the individual variables. In some cases, there were differences between teachers according to gender. Research shows mixed findings on which gender is more sensitive to environmental issues, with women reported to have a more moralistic attitude toward the environment (Oncu, & Unluer, 2015). We should also mention the tendency for younger teachers to be more willing to be educated on the issues, a finding which should be investigated further.

Limitations and future directions

It is necessary to point out some shortcomings of the survey. The sample was small and ad hoc, so it is not possible to generalise the results to the general population of teachers. The sample was also not evenly structured with respect to all the variables studied in the paper. As this is a sensitive topic, it is possible that some teachers may have given socially desirable answers. Despite these shortcomings, the survey provided welcome insight into teachers' perceptions of the environmental crisis. Future research will therefore be needed to investigate whether attitudes influence individual actions in relation to the environmental crisis. The latter will be the focus of research in a future paper.

Data from the full survey will serve as the basis for the development of modules for short-term training (micro credentials) targeting various groups, including adult employees or graduates who need to requalify, current students, potential dropouts, and those who have never been involved in higher education; as a career opportunity or aim to enrich the overall range of their competences and knowledge.

References

Blake, J., Sterling, S., & Goodson, I. (2013). Transformative Learning for a Sustainable Future: An Exploration of Pedagogies for Change at an Alternative College (online), *Sustainability, 5*(12). http://www.mdpi.com/2071-1050/5/12/5347

Brundtland G. H. (1987). *Our common future, from one earth to one world: An overview by the world commission on environment and development.* World commission on environment and development. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Cayolla, R., Escadas, M., McCullough, B. P., Biscaia, R., Cabilhas, A. & Santos, T. (2023). Does pro-environmental attitude predict pro-environmental behavior? Comparing sustainability connection in emotional and cognitive environments among football fans and university students. *Heliyon, 9*(2023) e21758. https://doi.org/10.1016/j.heliyon.2023.e21758

Climate Change Remains Top Global Threat Across 19-Country Survey (2022). *Pew Research Center.* https://www.pewresearch.org/global/2022/08/31/climate-change-remains-top-global-threat-across-19-country-survey/

Climate Change: Evidence & Causes (2020). US: Royal Society and National Academy of Sciences. https://royalsociety.org/~/media/royal_society_content/policy/projects/climate-evidence-causes/climate-change-evidence-causes.pdf

Demirkaya et al., (2020). An Investigation of Prospective Teachers' Attitudes Towards National Parks and Views on Ecology-Based Environmental Education. *Journal of Educational Issues, 6*(2), 2377-2263. https://doi.org/10.5296/jei.v6i2.17379

Kallis, G. (2011): In defence of degrowth. *Ecological Economics, 70*(5), 873-880.

Kitchenham, A. (2008). The Evolution of John Mezirow's Transformative Learning Theory. *Journal of Transformative Education, 6*(2), 104-123.

Kothari, A., Demaria, F., & Acosta, A. (2014). Buen Vivir, degrowth and ecological Swaraj: alternatives to sustainable development and the green economy. *Development, 57*(3-4), 362–375. https://doi.org/10.1057/dev.2015.24

Kroflič, R. (2010). A dialogical concept of authority as a struggle for mutual recognition (A feminist critique of the Lacanian view on authority). *Journal of Contemporary Educational Studies, 61*(127), 134-154.

Lerch, D. (ed.) (2017). *The Community Resilience Reader: Essential Resources for an Era of Upheaval.* https://doi.org/10.5822/978-1-61091-861-9

Marentič Požarnik, B. 2000. *Psihologija učenja in pouka.* Ljubljana: DZS

Milfont, T. L. (2010). Global warming, climate change and human psychology. In V. Corral-Verdugo, C. H. Garcia-Cadena, & Frias-Arment (EDS.). *Psychological approaches to sustainability: Current trends in theory, research and practice.* New York: Nova Science Publishers. https://cssn.org/wp-content/uploads/2020/11/pub_climate.pdf

Novak, B. (2006). *Moč družbe in transformacija šole.* Ljubljana: Pedagoški inštitut.

Oncu, E. C., & Unluer, E. (2015). Environmental views and awareness of preschool teacher candidates. *Social and Behavioral Sciences, 174*, 2653 – 2657.

Peček Čuk, M., & Lesar, I. (2020). *Moč vzgoje.* Ljubljana: Pedagoška fakulteta.

Ravni avtonomije in odgovornosti učiteljev v Evropi (2008). Eurydice - informacijsko omrežje o izobraževanju v Evropi, T. Plevnik (ed.). Ljubljana: Ministrstvo za šolstvo in šport. https://www.eurydice.si/publikacije/Ravni-avtonomije-in-odgovornosti-u%C4%8Diteljev-v-Evropi-SI.pdf?_t=1570524811

Reckien, D., & Petkova, E. P. (2019). Who is responsible for climate change adaptation? *Environmental Research Letter, 14*, 014010. https://doi.org/10.1088/1748-9326/aaf07a

Redclift, M. (2005). Sustainable Development (1987-2005): An oxymoron comes of age. *Sustainable Development, 13*(4), 212-227. https://doi.org/10.1002/sd.281

Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. *Science of The Total Environment, 786*(2021), 147481. https://doi.org/10.1016/j.scitotenv.2021.147481

Stanišić, J. M. (2016). Characteristics of teaching environmental education in primary schools *Inovacije u nastavi, XXIX*(4), 87–100. doi: 10.5937/inovacije1604087S

Teachers have their say: Motivation, skills, and opportunities to teach education for sustainable development and global citizenship (2021). Paris, Brussels: UNESCO and Education International.https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p::usm

arcdef_0000379914&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/atta
ch_import_94f069db-fc96-48cd-baf6-
db5fad268a70%3F_%3D379914eng.pdf&locale=en&multi=true&ark=/ark:/48223/pf00003
79914/PDF/379914eng.pdf#1112_21_TEACHERS_HAVE_THEIR_SAY.indd%3A.20128
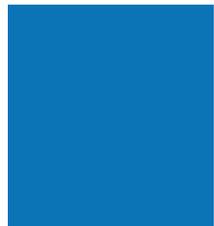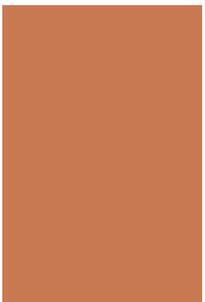%3A912

The 2030 Agenda for Sustainable Development (2023). New York: United Nations, SDG Summit, 18-19
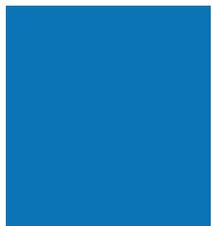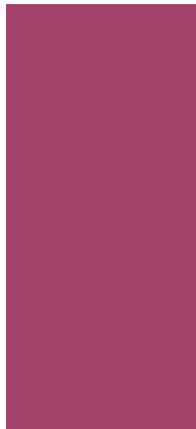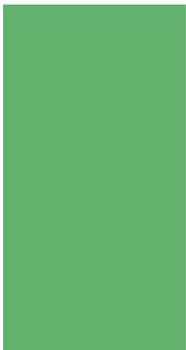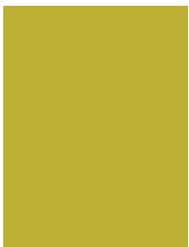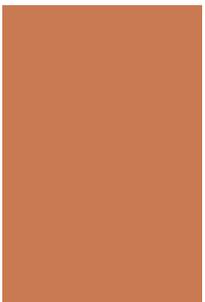September 2023. https://www.un.org/en/conferences/SDGSummit2023

Transforming Our World: The 2030 Agenda for Sustainable Development (2015). New York: United Nations,
SDG Summit, 25-27 September. https://sdgs.un.org/publications/transforming-our-world-
2030-agenda-sustainable-development-17981

Ustava Republike Slovenije (URS) (1991). http://pisrs.si/Pis.web/pregledPredpisa?id=USTA1

LANGUAGES IN EDUCATION

Promoting Sustainable Development While Building Upon Components of Reading Literacy

Barbara Bednjički Rošer,[1] Dragica Haramija[1,2]

[1] University of Maribor, Faculty of Education, Maribor, Slovenia
barbara.bednjicki@um.si, dragica.haramija@um.si
[2] University of Maribor, Faculty of Arts, Maribor, Slovenia
dragica.haramija@um.si

The paper sheds light on the evaluation of books for pre-school children and the theory of reading children's literature while bearing in mind the various components of reading literacy. Like reading literacy, education on sustainability is also a life-long process, and for understanding the concept of sustainability and the role of the individual in its implementation, which begins to form in the pre-school period, we chose the work by Adèle Tariel and Julie de Terssac *1000 Cows* (French original: *1000 vaches),* which indicates that illustrations affect the comprehension of the story and (at least partially) change or present more clearly the key morphological characteristics of the text. We conducted a case study in which we included part-time students from the third year of Early Childhood Education Studies (n = 13). An analysis of the content of responses was carried out. These demonstrate a broad semantic field of understanding literary-artistic reading and represent an example of interdisciplinary integration that can significantly contribute to the development of components of reading literacy as well as a sustainable future.

SPODBUJANJE TRAJNOSTNEGA RAZVOJA OB UPOŠTEVANJU GRADNIKOV BRALNE PISMENOSTI

BARBARA BEDNJIČKI ROŠER,[1] DRAGICA HARAMIJA,[1,2]

[1] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
barbara.bednjicki@um.si, dragica.haramija@um.si
[2] Univerza v Mariboru, Filozofska fakulteta, Maribor, Slovenija
dragica.haramija@um.si

Prispevek osvetljuje vrednotenje knjig za predšolske otroke in teorijo branja otroške književnosti z upoštevanjem gradnikov bralne pismenosti. Vzgoja za trajnostni razvoj je tako kot bralna pismenost vseživljenjski proces, zato smo za razumevanje pojmovanja trajnosti in vloge posameznikov pri njenem uresničevanju, ki se prične oblikovati že v predšolskem obdobju, izbrali delo Adèle Tariel in Julie de Terssac *1000 krav,* ki kaže, da ilustracije vplivajo na razumevanje zgodbe in (vsaj delno) spreminjajo oziroma natančneje predstavljajo osnovne morfološke značilnosti besedila. Izvedli smo študijo primera, v katero smo vključili izredne študente tretjega letnika Predšolske vzgoje (n = 13). Opravljena je bila analiza vsebine odgovorov, ki izkazujejo široko pomensko polje razumevanja literarno-likovnega branja in predstavljajo primer medpodročnega povezovanja, ki lahko pomembno prispeva k razvoju gradnikov bralne pismenosti in trajnostne prihodnosti.

1 Introduction

The article addresses two different issues which are complete and separate in their own right, and at the same time also interdependent: evaluating books for (preschool) children and discussing quality works on the chosen theme on the one hand, and the theory of reading children's literature in educational institutions (nursery schools) while bearing in mind components of reading literacy on the other.

For an in-depth analysis the picture book *1000 Cows* (original French title: *1000 vaches*, Editions Père Fouettard, 2017, Slovene edition *1000 krav*, Založba Pivec, 2023) by writer Adèle Tariel and illustrator Julie de Terssac was selected, the main theme of which is a society that is inclusive, technologically competent and environmentally sustainable. We believe that reading material contributes to comprehending the notion of sustainability and the role of individuals in its implementation. The nursery school environment forms the foundations of life-long learning and is an important component of sustainable development for creating a better world. In her article on the importance of education on sustainable development, Saša Kregar stresses that education is a strong catalyst in a positive shift in mentality and can support the inclusion of all aspects of sustainable development (Kregar, 2022). Through reading events, teachers can encourage knowledge, skills, values and opinions which will enable children to participate in sustainable development. For acquiring a variety of knowledge and skills, and developing various capabilities and values, a child develops a palette of literacies during early education, and these literacies are 'conducted and developed through language' (Svetlik *et al.* 2022, p. 135), so the basis of all of these is a continually developing reading literacy.

An education for a sustainable future connects cognitive, emotional-motivational, value, and action-skill aims (Lepičnik Vodopivec, 2014). In the preschool period, the focus is on the emotional orientation of educational activities, and instilling important values is linked to understanding these phenomena and the connection between them, forming opinions and the development of creative and critical thought, so it is important to be aware that, through reading events and quality reading material at nursery school, we can make an important contribution not only to the development of reading literacy but also to a sustainable future. Contemporary children's literature also documents the consequences of human impact on the

environment such as pollution, urbanisation, intensive livestock farming, growth of emissions and greenhouse gasses, etc. It can be the starting point for educators in informing and raising children into responsible and informed individuals and through reading enable the younger generations to 'develop values, acquire knowledge and skills for solving environmental and social challenges', while sustainability is ensured 'precisely by the social-emotional component that with children influences the adoption of values and formation of attitudes.' (Marić Jurišin, Šafranj and Malčić, 2020, pp. 52, 64). Talking about what has been read and associated creative activities thus not only bring new knowledge but also shape personality traits and sustainability awareness.

In evaluating children's literature, the process must be directed towards the young reader and their (gradual) development of reading comprehension with the possibility of a critical response to reading material. Through the educational process we develop elements of individual components together with other components of reading literacy, tied in with the aims and contents of all areas of curriculum activities. Also important are factors listed by the IFLA (2018) as the foundations of literacy: access to reading materials (surrounding a child with meaningful reading material), adults as a reading role model, and adults prepared to read to a child while it is still unable to do so itself. When it comes to the dual addressee for children's literature, that is the young reader (or in early childhood in fact the listener) and the adult (professional or non-professional) mediator, we need to highlight the connection between the adult/reader and the child/listener in the preschool period (Pattison, 2021; Sipe, 2001), especially with picture book material. Despite the diverse perception of the term dual addressee, it in essence emphasises the different understanding by an adult and by a child of the same texts (and illustrations), which stems from life experiences, reading habits, living environment, interests, beliefs, worldview, and moral values. A reading event enables us to develop the initial subjective literary-aesthetic experience with a response to the text and encourages understanding and appraisal of the text in terms of the level of recall, comprehension with reasoning and evaluation (Saksida, 2017, p. 53). What is important in discussing texts – at all levels – is the use of a unified (literary theoretical) terminology of literary genre and the separation of book genre from book forms. Results of research on comprehending the structure of common literary genre (Kamberelis 1999; Kordigel and Šega, 2000; Pinto *et al.*, 2020) in children's and YA literature have shown that

children begin to link the correct terminological designations with the structure and elements of a specific literary genre at a relatively early age.

The Slovene edition of the picture book *1000 Cows* (Tariel and Terssac, 2023), presented in detail in this research, was published within the framework of the *Pulse of European Literature* project*,* which aims to publish contemporary literary works from European Union countries, aiming to address the common European identity, striving for inclusiveness, embracing diversity, and ensuring equality for all people with particular attention to the environment and the fight against climate change, which educators can gradually develop with children at nursey schools through 'problem sensitivity, awareness of strategies aimed at solving the problem and searching new ways and solutions' (Dolinar and Likar, 2021, p. 72).

2   Methodology

The aim of the research was to examine the impact of the multimodal work on approaches to developing the components of reading literacy in the preschool period, and identifying and connecting the literary experience of future educators in raising awareness and promoting sustainable development with preschool children. We set ourselves the following research questions:

- Which code of communication in the multimodal work (verbal or visual) will the students' notes focus on?
- Which components of reading literacy will future educators connect to the literary experience of an individual's relationship to animals and nature to gradually develop sustainable interaction?
- Will students in developing individual components of reading literacy link proposed activities with sustainable development and plan interdisciplinary activities?

Descriptive and compilation methods are used for theoretical starting points as the aim is to shed light on the problems of terminology using established literature. A synthesising approach is used in the concluding part.

The research used qualitative methods of scientific pedagogic research that is based on case studies 'with an emphasis on understanding and interpretation' of participants' responses (Vogrinc, 2008, p 49; Mesec, 2023). The purpose of the article is to present the results of the case study conducted in December 2023 at the University of Maribor Faculty of Education.

The research involved 13 students, the research sample (n=13) was a convenience sample and included part-time third-year Early Childhood Education Studies students, who in the 2023/2024 academic year attended the elective class on Family Literacy.

Collecting data was based on a multimodal analysis (Table 1) of the selected work, *1000 cows* by Adèle Tariel and Julie de Terssac, first published in Slovene in 2023. The criteria for selecting the reading material are literary (Haramija, 2017, pp. 24–25; Kos, 2001, pp. 23–37) and artistic (Zupančič, 2017, p. 44) with the opportunity for implementing raising awareness on sustainable development with preschool children. Collecting data was carried out in accordance with the ethical principles of research, the purpose of the research was presented to participants, they were invited to participate voluntarily and endured the anonymity of their answers. We asked the students to read the literary work and then write down their answers to the questions. We carried out an analysis of the content of answers to ten open questions with which we had in advance set the themes (components of reading literacy):

1. How would you use the selected picture book to develop speech at nursery school?
2. What could in your opinion arouse the attention and reading motivation in children for reading the selected picture book?
3. In what way can the selected picture book contribute to the understanding of the concept of reading material?
4. How might you, with the help of the selected picture book, develop individual levels of phonetic awareness at nursery school?
5. Does the selected picture book offer an opportunity for vocabulary development?
6. What questions would you use to verify comprehension?

7. Give examples of activities through which you would encourage children's responses to the selected text and with which you would encourage text production.
8. Which part of the picture book do you believe encourages evaluation or presents an opportunity for children to develop their own opinion?
9. Have you read or are you aware of any other picture book for preschool children by the selected author? If so, list which one.
10. Were you to read the selected picture book to children at nursery school today, what activity would you chose straight after reading?

We obtained qualitative data, which we reviewed, coded and categorised (Mesec, 2023, pp. 116–122) with the aim of finding meaningful parts of the texts that are relevant to the objectives of the research. An analysis of the content of answers to the open questions was carried out, the interpretation is presented in chapter 3.2.

3 Results and Discussion

The picture book *1000 Cows* by writer Adèle Tariel and illustrator Julie de Terssac, first published in Slovene in 2023, translated by Marko Bratina, is almost a manifesto against mass production (Figure 1). As the book is about cows, it looks at the case of milk and dairy products (the dairy industry), but, of course, anything we begin to name with numbers because we run out of names can be – extremely dangerous. At the same time, the picture book reinforces the view that money is not the (only) way to happiness.

3.1 Multimodal analysis if the picture book *1000 Cows*

The cover (Figure 1) depicts idyllic nature, a flowering meadow and sun-lit mountains in the background; even the milk carton placed in these idyllic surroundings suggesting a different content is coloured pleasantly. On one side of the milk carton are the names of the authors and the translator, the other depicts a cow's head and the title of the picture book. A negative note to this idyllic atmosphere is brought by a barbed wire fence built around the milk carton and the tall chimney behind it with black smoke billowing from it. The front endsheet in the original French version has a two-line dedication, in the Slovene version two lines of acknowledgment are added to the dedication:

'This picture book is dedicated to Vivien and all breeders
striving to live in freedom and in harmony with the environment.
It is also dedicated to all the cows whose names
we borrowed for the book's Slovene edition.'
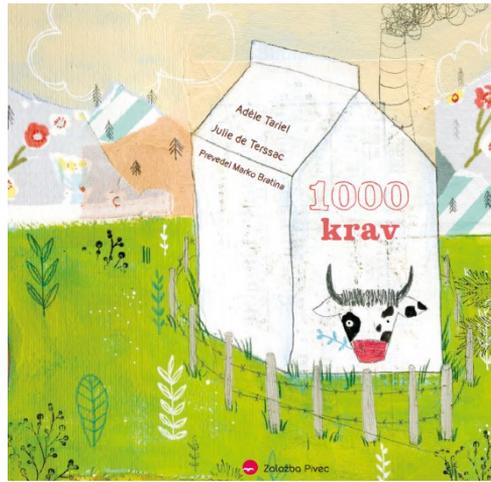
Figure 1: Front cover of the picture book.
Source: Tariel and Terssac, 2023, with permission of the publisher.

This is followed by a titlepage, on the left side of which is the colophon; the right page repeats the title, the authors of the text and illustration, the translator and a vignette illustration of a man lying in the grass enjoying nature.

Table 1: Text and illustration in the picture book *1000 Cows*

	Text	Illustrations
1	A farmer had three cows, Ajda, Buba and Cvetka (*N.B. these are the Slovene names of the cows, in the French original they are called Mariette, Ginette & Georgette*). He looked after them well and in exchange they gave him milk which he was able to exchange in the village for other things he needed in life (bread, sausages, pumpkins).	The illustration depicts cows that are smiling, surrounded by idyllic high-altitude scenery, they live in a remote place with the farmer in a green natural environment. The farmer is also smiling; the reader discovers that the man on the inside cover vignette is the farmer (he is dressed the same in this illustration), his face is calm and content.
2	One day a man from town appears on the farm – he is called the Tie-man; he suggests the farmer should have more	The clothes of the newcomer are highlighted (a coat printed with numbers), his face is smiling, he is drinking milk. The farmer and all three cows are curious (only parts of their heads can be seen in the illustration) – they

	Text	Illustrations
	cows and he would undertake selling the milk.	are all out in the field and the unannounced guest is on the other side of the fence. It is not entirely clear whether the cows and the farmer are in the enclosure or the newcomer.
3	Following the advice from the town visitor, the farmer acquires another three cows, Pika, Liska and Miška.	The original three cows and the three hew ones stand opposite each other as if ready for a battle. They look very different: the original ones are various shades of brown, one has flowers in its horns, the three new ones are patchy (black and white). Standing in the middle of the illustration is the man from town, holding a pail of milk in each hand, he has no face (his face is empty – lacks eyes, a nose and a mouth). The surrounding nature is still equally beautiful; the cows are placed in the pasture.
4	The farmer has purchased even more cows; there are now 17 – they still all have names. The Tie-man urges the farmer to sell even more milk.	The double page has two separate illustrations: bottom left is the Tie-man, wearing his coat printed with numbers, his tie is also accentuated; on the right page are four milk cartons which have MILK MOO printed on one side and ULTRA GOOD 100% COW'S MILK (intraiconic text) on the other. Behind the milk cartons are financial statements (with BUSINESS written on them). There are no cows in the illustration.
5	More and more cows kept arriving at the farm. To start with, the farmer tried to give them all names, but after a while he just gave them numbers. Sometimes it seems as if the original cows are giving him doubtful looks.	The single page illustration is filled with cows, no part is left empty and there is no nature left. Only Ajda, Buba and Cvetka stand out, being brown – all other cows are black and white and have numbers written on their backs.
6	Three days later the Tie-man delivered more cows (numbers 35 to 80).	The cows are coming out of a delivery truck, the Tie-man is happy, the farmer looks sad, his posture indicates he is not happy. The scene is set in the meadow, the new cows are being observed by two others who are also among the newcomers (they are black and white); the absence of the farmer's original three cows is obvious.
7	With the hundredth cow, the Tie-man acquires a milking machine; he wanted even more cows as the milk was selling well. Ajda, Buba and Cvetka only rarely see each other in the crowd of cows.	The man from town is smiling because business is going well. On the left side are five cows (which show no emotions), attached to the milking machine. To the right is the farmer, his face in the forefront lets us know he is sad, even lost. It is as if he no longer fits into this milk-production facility. Pages of accounting books serve as a background to the illustration.
8	Stepping up production – the farm transforms into a factory. There are now 800 cows, modernisation is described (conveyor belt, hey crane, milking machines).	Running in front of the cows is a conveyor belt for food, they are attached to a milking machine. The computer screen is recording record milk production. Once again, the background to the illustration are pages from accounting books. The farmer and the original three cows are not in the illustration; the absence of

	Text	Illustrations
		humans is shocking – there are no people, the cows are depicted as machines.
9	There were never 1000 cows because seven of them disappeared: Ajda, Buba, Cvetka, 429, 512, 826 and 901. The farmer sets out to find them.	On the left side are Ajda, Buba and Cvetka (they all have travel bundles – a sign that they are leaving). They are crossing the stream and are surrounded by idyllic high-altitude pastures with green grass and mountains in the background. On the right side below the text are three black and white cows with the numbers written on their backs, following the path of the first three cows.
10	The farmer finds the runaway cows. In the pasture he lies down among them. Satisfied, he falls asleep; he is awakened by a lick on the face to find he is surrounded with all 1000 cows.	Two separated illustrations: left under the text is the depiction of the farmer, lying content in the grass (a repetition of the illustration in the inside cover vignette); the entire right page is a night scene – black and white cows wandering off into the distance, somewhere towards the mountains.
11	Ajda, Buba and Cvetka stayed with the farmer who promises them that the farm will no longer be industrial.	The cows and the farmer with satisfaction on their faces look towards the industrial barn with milk storage facilities and a pipeline taking milk into town. They are surrounded by idyllic nature, the only reminder of the famer's previous calculations are the numbers written out on the outside of the barn.
12	997 cows have apparently found a high-mountain pasture which they now inhabit.	The illustration depicts a magnificent view of the natural surroundings, filled with mountains in the background, sunny meadows and forests below them. The meadows are dotted with tiny black and white dots representing cows. The minuscule size of the cows (almost unrecognisable) makes the surrounding nature looks even greater and more magnificent. The wooden sign has 1000 COW PLATEAU written on it (intraiconic text).

The realistic short story *1000 Cows* is a warning about contemporary consumer society. The content farmer has three cows and calls them by their names, he lives in an idyllic natural environment and has time for his friends. A chance visitor tries the farmer's home-produced milk and senses he can make some money. He convinces the farmer into expanding his business which grows to the point when we can no longer talk of a farm but an industrial plant (Figure 2). The farmer is no longer happy, he has no time for friends; the turning point occurs when seven cows (the original three, Ajda, Buba and Cvetka, and four of the numbered ones) escape. The farmer sets out to find them and decides he will abandon mass production, returning home with his three cows. All the others find their way to a high-mountain pasture where they can graze freely in the meadows. The focus in on the tranquillity of the natural environment as the opposite to human consumer society. In the illustrations this divide is shown with the idyllic grassy landscape and the range of

mountains in the background, and on the other hand the absence of living beings – when the cows are no longer depicted as animals but milk cartons. The text and the illustrations are in complete interaction, complementing each other and jointly creating a whole.
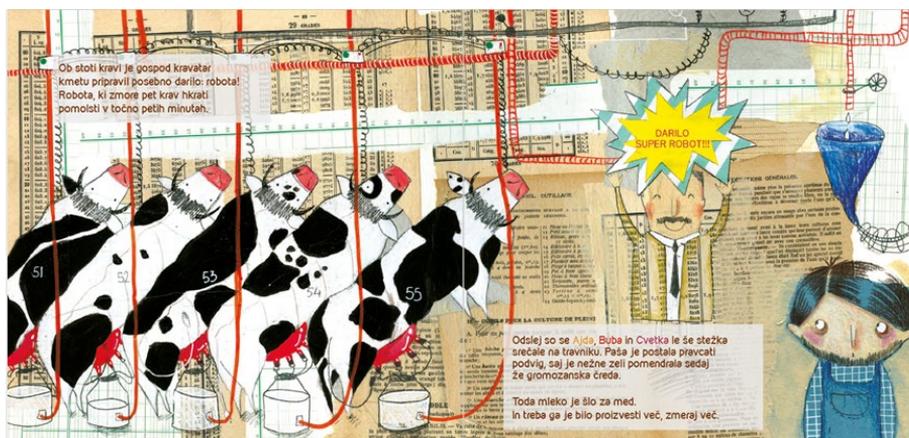
Figure 2: The happy Tie-man and the worried farmer in the specialised dairy farm.
Source: Tariel and Terssac, 2023, pp. 17–18, with permission of the publisher.

3.2   Analysis of answers to the set questions

Through a literary experience of the relationship of an individual and society towards nature, animals and the environment, the selected picture book by Adèle Tariel and Julie de Terssac: *1000 Cows*, taking into account the age of those it addresses (preschool children), raises awareness of current and pressing challenges of our overburdened environment, the global consequences of irresponsible human activities (overexploiting ecosystems), and promotes inclusive sustainable action and 'taking the initiative for creative solutions and their realisation.' (Drljić and Riccarda Kiswarday, 2021, p. 19).

Components of reading literacy (Haramija, 2020), a life-long development, are promoted as a process at nursery schools through goals and content in all areas of curricular activities,[1] because a comprehensive treatment of reading material encourages interdisciplinary integration that is considered a modern didactic

---

[1] Areas of curricular activities at nursery school level are: movement, language, art, society, nature and mathematics.

approach facilitating multiple aspects of connecting information. The research has enabled an insight into the comprehensive treatment of the literary work through a direct link with components of reading literacy.

In the preschool period, vocabulary, phonetic awareness and speech are strongly linked, as the development of speech is most intense at this time. Caring for speech development is one of the most important roles of nursey schools (Šek Mertük & Cugmas 2020), with speech a complex ability (Alatalo & Westlund, 2021; Hindman *et al.*, 2022; Vukelich *et al.*, 2019), that is predicted by several factors and can be encouraged in various ways. In answering the first question on how the selected picture book might be used to develop speech at nursery school, the respondents gave different examples of **describing illustrations** ('after reading the story we would look at the pictures, the children would describe them,' 'we would describe the cows in the illustrations,' etc.), **guided conversations** ('we would discuss healthy lifestyles,' 'we would talk about our attitudes towards nature and animals,' 'we would talk about farm animals,' 'we would talk about responsible treatment of animals,' 'we would talk about how to stay in touch with nature,' etc.), **storytelling with illustrations** ('children would tell stories about the illustrations,' 'we would recount the story through the illustrations,' 'by looking at the illustrations we would discuss the content' etc.)*,* **describing literary characters, events, the literary space** ('we could discuss how the farmer felt with his three cows, how he felt when he had a thousand cows,' 'we could discuss the actions of Mr Tie-man,' 'children would talk about the event they liked most,' 'children would describe where the story takes place,' 'children would present their favourite character,' 'children would discuss their own experiences on a farm, etc.), which proves their knowledge of elements of speech components. Research by Marjanovič Umek, Krajnc and Fekonja (2006) showed that beside the family environment, frequent reading in nursery school contributes significantly to higher levels of speech development where the educator's way of reading and the frequency of speech interactions are very important. At the same time, answers show that the participating part-time students would link speech activities with the literary experience of the individual's attitude to animals and nature, thereby encouraging the social-emotional component of sustainability that affects the acquisition of values, the formation of attitudes, and the development of ethics and morals.

Reading motivation enables faster progress in the development of reading literacy (Bošnjak & Košir, 2020). Reading motivation is closely related to text comprehension and at the same time encourages interest in reading and a positive attitude towards reading. It is about the desire to read or listen due to the satisfaction a child feels when reading. The key purpose of reading motivation in nursery school, 'is encouraging the readiness of children to accept texts and shaping their expectations' (Saksida, 2017, p. 53). We reviewed the responses to the second question, where respondents wrote down what might trigger attention and motivation for reading the selected picture book. The diversity of responses indicates that in planning reading events, respondents would prepare the horizon of children's expectations (Kordigel Aberšek, 2008, pp. 111–112) with various forms of introductory motivation which we divided into two categories (Table 2). Included in the first group are responses which stem from announcing the content of the reading material (imaginative motivation), and in the second group responses that stem from the children's experiences (experiential motivation).

Table 2: Introductory motivation

Announcing the content of the reading material	Announcing the content through experiential motivation
'we would take a look at the front cover of the picture book' 'we would look at the front cover and talk about it' 'I would read the title to the children and we would think about the content' 'I would put various books on cows in the book corner' 'with a riddle about cows' 'with a talk about farms, farm animals'	'having milk for breakfast, we would discuss where it comes from' 'we would visit a farm and see how cows are milked' 'I would ask the children if they knew any stories about cows'

Contemporary literary-receptive teaching of children's literature acknowledges a number of reading motivation typologies that are formed according to criteria defined by the text as a literary form of art, as well as criteria determined by the teacher's knowledge of the children, their receptive abilities and their pre-textual experiences (Kordigel Aberšek, 2008, p. 117; Saksida, 1994). In the pre-school period, the purpose of reading motivation with children is to create anticipation. This begins with the teacher's thoughts on how to conduct a reading event at nursery school and how to prepare the children for listening to the selected text. The answers indicate that participants in the study would derive the initial motivation for reading

from both codes of communication and link it with curricular activities from other areas.

Picture books in which linguistic and visual codes of communication are closely intertwined (Table 2), are especially suitable for developing multimodal literacy and comprehending the concept of reading material at nursery school (Haramija and Batič, 2016, 2020). When reading multimodal texts, the illustration is an equivalent carrier of information and contributes importantly to the development of visual literacy. The answers given by respondents to the question about the ways the selected picture book *1000 Cows* might contribute to the comprehension of reading material included suggestions that 'the illustrations in the picture book complement the text,' 'the figures in the illustrations clearly show emotions,' 'the illustrations precisely depict technological advantages of large farms such as automatisation of work – a milking machine, robotisation,' 'there is a lot of intraiconic text which additionally exposes the tie-man's attitude towards animals,' 'the title page illustration of a cow as a milk carton in a barbed wire enclosure symbolizes the entrapment of animals for profit,' 'the chimney symbolizes the farm as a mass livestock factory which beside producing food creates greenhouse gasses that affect climate change,' etc., which suggests that the content would also be meaningfully read through reading the illustrations (images), which 'represents a starting point in the development of visual literacy and interactive meanings of the story' (Bednjički Rošer and Batič, 2022, p. 120).

As well as their meaning, words also have a phonetic form which in the alphabetical system of writing hold a key role in learning how to read and write (Zemljak Jontes & Bednjički Rošer, 2020). Phonetic awareness which is conditioned by the mental development of children develops gradually, with individual levels in sequence from less demanding activities – recognising long and short words, recognising and forming rhymes, to the more demanding – syllabification, awareness of the beginnings and ends of words, to the highest – phonemic awareness that involves recognising, manipulating and combining sounds into words. To the question on how they might use the selected picture book to develop phonetic awareness in nursery school, respondents gave examples (Table 3) which we classified according to the level of difficulty.

Table 3: Levels of phonetic awareness

Levels of phonetic awareness	Phonetic awareness abilities	Examples from the picture book
1. level	Recognising short and long words	*noč – prijatelj* *kruh – klobasa* *kmet – kravatar*
2. level	Recognising and forming rhymes, alliterations	*Cvetka – Metka* *Breza – Majoneza* *Zinka – Palačinka* *kompot – robot* *vrtiljak - tovornjak* ***k**met, **k**rava, **k**ravatar* ***B**rena, **B**oža, **B**reza, **B**uba*
3. level	Syllabification	*to-vor-njak, kme-ti-ja, čre-da*
4. level	awareness of the beginning and end of words	*tra**k**, **k**rava,* ***m**leko, **č**reda, **t**ravnik*
5. level	Phonemic awareness	*n-o-č*

The development of speech and communication skills is conditioned by the knowledge of words and their use, so vocabulary is one of the basic components of reading literacy (Coyne *et al.*, 2022; Voršič & Ropič Kop, 2020), as its extent is the best indicator of reading comprehension (Pečjak, 2010). Respondents were asked whether the selected picture book offers an opportunity to develop vocabulary. Their answers show the diverse opportunities for broadening vocabulary which in the preschool period develops and increases rapidly. In terms of vocabulary development, it is known that children understand words before they are capable of speaking to them and also that there are great individual differences between children of the same age. The picture book *1000 Cows* enables an expansion of vocabulary; among words that they might give children additional explanations, respondents listed: *molža* (milking), *kangla* (pail), *hlebec* (loaf), *gostija* (feast), *razlegati se* (spread out), *tekniti* (enjoy eating), *povpraševanje* (demand), *nabava* (purchase), *vztrajati* (persist), *čreda* (herd), *zadostovati* (satisfactory), *stežka* (with difficulty), *spreleteti* (occur), *čemeriti se* (be sullen), *navdih* (inspiration), *skleniti* (conclude), *nabito poln,* (full to the brim), *paša* (graze), *pomendrati* (trample), *truma* (troop), *tovarna* (factory), *rekord* (record), *ubežnice* (fugitives), *spokojno* (tranquil), *pompom* (pompom), *poslovanje* (business) etc. Figurative meanings that would be discussed with children: *nekaj gre za med* (lit. something goes for honey, meaning it sells well), *biti izžet* (lit. be squeezed, meaning be drained), *tešiti žejo* (quench thirst), *iti v gosjem redu* (lit. walk in a goose line, meaning walk in line, single file), *biti kos nalogi* (be up to a task), *gledati postrani* (lit. look sideways, meaning give a doubtful look), *debelo gledati* (stare), *strto srce* (broken

heart)*, travnik se poleti posuje s cvetlicami* (in the summer the meadow is sprinkled with flowers)*, ožarjen s sojem lune* (lit by moonlight) etc.

Table 4: Questions with which one might verify the comprehension of the reading material

Questions relating to the text:	Questions relating to the illustrations:
Who is the story about, who appears in the picture book? *What did the cows give the famer?* *What did the farmer exchange the milk for in the village?* *Who visited the farmer?* *What did he want from him, what did he suggest?* *What did the farm turn into?* *Why does Mr Tie-man buy so much milk? Does he drink it all himself?* *How did the famer name the cows when he no longer had the inspiration to choose names for them?* *Why did the farmer begin writing numbers on the cows' backs?* *How many cows did the famer have?* *Who milked the cows when there were many?* *How did the farmer feel when he had lots of cows?* *Where did the cows go to?* *Did the farmer find them?* *Which cows stayed with him?* *Where did the other go to?* *What did the farmer decide in the end? Why did he decide this?*	*Can you recognise which cow is Ajda, which is Buba, and which is Cvetka?* *Does the farmer have a large farm?* *What is Mr Tie-man like? Why does he have numbers on his coat?* *Do the new cows look like Ajda, Buba and Cvetka?* *Are pails still used for milk when the farm expands?* *Why is Mr Tie-man so happy?* *Why are there so many numbers in the background of the milk cartons?* *How does the farmer feel when he sees the lorry full of new cows?* *What does the new robot do? Is the farmer glad of the new present?* *What happens with the cows in the new barn? What do they eat?* *Where did the cows set off for?* *What happened to them?* *What are the cows doing now?*

An opportunity to develop the component of text understanding which is conditioned by other components such as response to the text and creating texts, critical reading, reading motivation, vocabulary and speech, are in nursery school provided by all language-speech interactions in which children participate (Krajnc Ivič, 2020). The foundations for achieving the goals of text understanding in preschool education are visual and auditory perception, which are improved through reading or listening and observing texts, discussion with the help of illustrations, composing the whole from individual parts, looking for similarities, differences etc. In the research, respondents listed questions with which they might test the children's understanding of the selected picture book. We have classified the questions into two categories (Table 4), based on whether they relate to the text or the illustrations, which shows the research participants' focus on both (verbal and visual) codes of communication.

During the preschool period, the component of response to the text and text formation is demonstrated through the child's formation of appropriate and meaningful speech and the application of information or knowledge in new situations and is related to the comprehension of texts, read previously (Pinto, Tarchi & Bigozzi, 2019; Pulko & Kranjec, 2020). Although the *Kindergarten Curriculum* (Kurikulum, 1999) does not include text summarising (Baloh, 2019, p. 15), research (Baloh, 2019; Marjanovič Umek *et al.*, 2006) shows that this is the key activity after reading a text, which is important for the development of the child's pragmatic narrative skill when we develop the child's narrative scheme through planned activities (Tompkins *et al.*, 2019). Children gain narrative strategies gradually through developing the ability of expression and in the preschool period reach different narrative capabilities. It is important that we plan these on three difficulty levels: recalling verbal information, comprehension through reasoning, and text evaluation (Saksida 2017, p. 53). Through verbal teaching methods as responses to what is being read, 'it is possible and essential to develop these in the preschool period.' In this research, our respondents listed examples of activities that would encourage a child's response to what is being read: 'I would encourage children to discuss their visit to a farm,' 'I would prepare pictorial material (4–6 images), and invite the children to arrange it in the correct sequence while talking about the story,' 'I would instruct the children to continue the story about how the cows lived on the pasture high in the mountains,' 'we would make puppets and prepare a puppet show,' 'we would create a pocket story,' 'we would continue the story in our story-telling corner.' An analysis of the answers shows that respondents would use various methods of narrating (Baloh, 2019, pp. 117–118) and various post-creative activities, which indicates an interdisciplinary linking that is considered a contemporary didactic approach with the possibility of connecting information from multiple aspects.
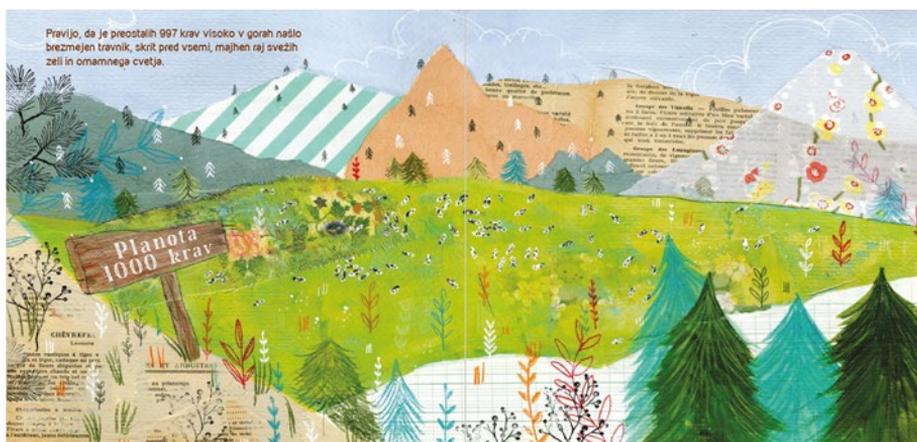
Figure 3: Living in freedom and harmony with environment.
Source: Tariel and Terssac, 2023, pp. 27–28, with permission of the publisher.

In the preschool period, critical reading provides a foundation for expressing one's own opinions and judging from experience. This component develops gradually, in the first age period children recognise the messages of simple illustrations, stories or information, in the second age period they already recognise the basic message and express their own opinion on the text (Licardo & Krajnc Ivič, 2020). The development of language, and with it also of critical reading, is naturally involved in all areas of activities and we can encourage it in nursery school through planned reading events (Saksida, 2017), where educators (after reading) expose the parts of the text that represent an opportunity for thought, discussion, and, taking into account the children's prior knowledge in the area of close development encourage values, cooperation, creativity, etc. The respondents were asked to find possibilities for evaluating the text (Figure 3) or expressing the children's own opinions from the selected text. They mentioned, 'the Tie-man's greed – we would discuss with the children whether money really brings happiness and satisfaction,' 'we would discuss irresponsible treatment of animals with the children,' etc. The answers given by respondents show how they would, taking into account the experiences of preschool children with a positive attitude to the environment and practical actions, strengthen the components of reading literacy and the importance of education for a sustainable future. Lepičnik Vodopivec (2014) states that education for sustainable development is already well-established in Slovene nursery schools. An important role in informing future generations is played by educators who (Lepičnik Vodopivec,

Mezgec & Šindić, 2023) spontaneously include all three dimensions of sustainability into their teaching practices (environmental, social, and economic).

All responses to the question on whether the respondents were aware of or knew any other work by the selected author were negative, as no other works by the author have so far been translated into Slovene.

The final question about which follow-up activity you might choose first after reading the selected text was set because we were interested to see which component of reading literacy respondents would reach for most often, recognising it with the selected picture book as the key for planning further activities or whether summarising the text is indeed, as shown by research, (Baloh, 2019; Marjanovič Umek *et al.*, 2006), the main activity after reading a text. Respondents listed: 'we would summarise the story through the illustrations,' 'first we would talk about content,' 'first we would talk about the picture book and its message,' 'we would visit the nearest farm and look at the animals,' 'the children would create a poster about cows, investigate dairy products and cut them out of advertising leaflets.' Mostly respondents noted that after reading they would first discuss the content, summarise the story, which indicates that they would most frequently develop speech, vocabulary, text understanding, and response to what was read, which is also linked with creating texts and critical reading. Saksida (2016, p. 235, 2017) explains the multi-layered creation of meaning in multimodal texts within a social context with the fundamental characteristics and phases of reading events from nursery school to higher education levels, stressing that the meaning of a multimodal text is a field that is continuously being built upon and co-shaped by all participants in the reading event.

4 Conclusions

The concept of sustainability and the role of the individual in its realisation begins to form in the preschool period, and education on sustainable development is, like reading literacy, a life-long process. This is shaped by the awareness and formation of attitudes towards nature and the environment. The selected picture book opens up important issues and, through the literary experience of the individual's and society's attitude towards nature, animals and the environment, taking into account the addressee's age (preschool children), raises awareness about the current

challenges of the overburdened natural environment, the global consequences of human activity and mass production. The respondent's answers reveal a wide range of perceptions and understanding of literary-artistic reading, which is of fundamental importance for reading literacy. As professional readers, educators are a reading example. Through reading, when it is conducted in a way that the children listening also look at the illustrations that contribute significantly to the understanding of the story, complement it or even change it or represent key morphological characteristics of the text, the adult reader helps the children recognise the direction of reading and the orientation in the reading material. The research, which is an example of cross-sector integration, demonstrates that discussing quality reading materials can have an important contribution to the development of components of reading literacy and a sustainable future.

Primary sources

Tariel, A. & Terssac, J. (2023). *1000 krav* (1000 Cows). Maribor: Pivec.
Tariel, A. & Terssac, J. (2017). *1000 vaches* (1000 Cows). Urmatt: Père Fouettard.

References

Alatalo, T. & Westlund, B. (2021). Preschool teachers' perceptions about read-alouds as a means to support children's early literacy and language development. *Journal of Early Childhood Literacy*, *21*(3), 413–435. https://doi.org/10.1177/1468798419852136
Baloh, B. (2019). *Umetnost pripovedovanja otrok v zgodnjem otroštvu* (The art of storytelling by children in early childhood). Koper, University of Primorska Press.
Bednjički Rošer, B. and Batič, J. (2022). Multimodalna pismenost študentov predšolske vzgoje (Multimodal Literacy of Student in Pre-School), *Pedagoška obzorja* (Pedagogical Horizons), Didactica Slovenica, 37(2), 112–124.
Bošnjak, B. & Košir, K. (2020), 2. gradnik: Motiviranost za branje (The Second Component: Reading Motivation). In D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (pp. 59–80). Maribor, Maribor University Press.
Coyne, M. D., McCoach, D. B., Ware, S. M., Loftus-Rattan, S. M., Baker, D. L., Santoro, L. E. & Oldham, A. C. (2022). Supporting vocabulary development within a multitiered system of support: Evaluating the efficacy of supplementary kindergarten vocabulary intervention. *Journal of Educational Psychology, 114* (6), 1225–1241. https://doi.org/10.1037/edu0000724
Dolinar, M. and Likar, B. (2021). Inovativnost in podjetnost na osnovni šoli – pot za doseganje vrha »Bloomove piramide« (Innovation and entrepreneurship in primary school – the way to reach

the top of Bloom's Pyramid). *Pedagoška obzorja* (Pedagogical Horizons), Didactica Slovenica, 36 (2), 64–77.

Drljić, K. and Riccarda Kiswarday, V. (2021). Prepletenost rezilientnosti in inkluzivnih kompetenc bodočih učiteljev (The interconnectedness of the resilience and inclusive competencies of future teachers). *Pedagoška obzorja* (Pedagogical Horizons), Didactica Slovenica, 36 (3-4), 3–25.

Haramija, D. (2022). Predgovor (Introduction). In D. Haramija (ed.) *Gradniki bralne pismenosti: teoretična izhodišča*. Maribor: Maribor University Press. https://press.um.si/index.php/ump/catalog/book/515

Haramija, D. (2017). Književnost v predšolskem obdobju (Literature in the preschool period). In D. Haramija (ed.), *V objemu besed: razvijanje družinske pismenosti* (pp. 23–30). Maribor, Maribor University Press.

Haramija, D. & Batič, J. (2020). 3. gradnik: Razumevanje koncepta bralnega gradiva (The Third Component: Understanding the concept of reading material. In D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (pp. 81–106). Maribor, Maribor University Press.

Haramija, D. & Batič, J. (2016). Pomen multimodalne pismenosti za branje slikanic (The importance of multimodal literacy for reading picture books). In T. Devjak and I. Saksida, (eds.). *Partnerstvo Pedagoške fakultete Univerze v Ljubljani in vzgojno-izobraževalnih inštitucij 2016: mednarodni posvet* (pp. 35–48). Ljubljana, Faculty of Education. http://www.dlib.si/details/URN:NBN:SI:doc-HK4MR5Q5

Hindman, A. H., Farrow, J. M. & Wasik, B. A. (2022). Teacher–Child Conversations in Preschool Insights into How Teacher Feedback Supports Language Development. *Topics in Language Disorders,* 42 (4), 336–359. DOI: 10.1097/TLD.0000000000000295 https://alliedhealth.ceconnection.com/files/TeacherChildConversationsinPreschoolInsightsIntoHo wTeacherFeedbackSupportsLanguageDevelopment-1668533234366.pdf

IFLA Library Services to Children and Young Adults Section (2018). *Developed by the IFLA Library Services to Children and Young Adults Section.* https://www.ifla.org/wp-content/uploads/2019/05/assets/libraries-for-children-and-ya/publications/ifla-guidelines-for-library-services-to-children_aged-0-18.pdf

Kamberelis, G. (1999). Genre Development and Learning: Children Writing Stories, Science Reports, and Poems. *Research in The Teaching of English, 33*, 403–460. https://www.csun.edu/~bashforth/305_PDF/GenreInLangArts/GenreDevelopmentAndLearning_RTE1999.pdf

Kordigel Aberšek, M. (2008). *Didaktika mladinske književnosti* (The Didactis of Children's Literature). Ljubljana: National Education Institute Slovenia.

Kordigel Aberšek, M. & Šega, M. (2001). O miselni shemi za recepcijo pravljice v predoperativnem in operativnem obdobju otrokovega bralnega razvoja (On the conceptual scheme for the reception of fairy tales in the preoperative and operative periods of children's reading development). *Jezik in slovstvo, 46(6), 257–272.* URN:NBN:SI:DOC-AON4G52D from http://www.dlib.si

Kos, J. (2001). Literarna teorija. Ljubljana: DZS.

Krajnc Ivič, M. (2020). 7. gradnik: Razumevanje besedil (The Seventh Component: Text comprehension). In D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (str. 187–210). Maribor, Maribor University Press.

Kregar, S. (2022). Pomen vzgoje in izobraževanja za trajnostni razvoj (The role of education in sustainable development). In T. Krapše, J. Bone, A. Polšak and S. Mršnik (eds.), *Pogled na šolo 21. stoletja v duhu kompetenc in pismenosti* (str. 27–35). Ljubljana: National Education Institute Slovenia. https://www.zrss.si/pdf/Pogled_na_solo_21_stoletja.pdf

Kurikulum za vrtce (Kindergarten Curriculum), 1999. Ljubljana: Slovenian Ministry of Education and Sport, National Education Institute Slovenia.

https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Sektor-za-predsolsko-
        vzgojo/Programi/Kurikulum-za-vrtce.pdf
Licardo, M. & Krajnc Ivič, M. (2020). 9. gradnik: Kritično branje (The Ninth Component: Critital
        reading). In D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (pp. 187–210).
        Maribor, Maribor University Press.
Lepičnik Vodopivec, J. (2014). Cilji, metode in pristopi vzgoje za trajnostni razvoj v vrtcu (Goals,
        methods and approaches of education for sustainable development in kindergarten). *Vzgoja in
        izobraževanje,* 45(4), 37–40.
https://www.dlib.si/details/URN:NBN:SI:DOC-3HERTGQG
Lepičnik Vodopivec, J., Mezgec, M. & Šindić, A. (2023). Pojmovanje trajnosti in njeno uresničevanje
        v realnem vrtčevskem okolju z vidika vzgojiteljic (The concept of sustainability and its
        implementation in a real kindergarten environment from the point of view of educators). In
        J. Lepičnik-Vodopivec, Jurka and M. Mezgec (eds.), *Vseživljenjsko učenje odraslih za trajnostni
        razvoj in digitalni preboj* (pp. 145–160). Koper: University of Primorska
        Press. https://www.hippocampus.si/ISBN/978-961-293-230-5.pdf
Marjanovič Umek, L., Kranjc, S. & Fekonja, U. (2006). *Otroški govor: razvoj in učenje* (Child speech:
        development and learning). Domžale, Izolit.
Marić Jurišin, S., Šafranj, J. and Malčić, B. (2020). Eko Programme as Factor of Socio-emotional
        Development of Preschoolers. *Pedagoška obzorja* (Pedagogical Horizons), Didactica
        Slovenica, 35 (2), 52–68.
Mesec, B. (2023). *Kvalitativno raziskovanje v teoriji in praksi* (Qualitative Research in Theory and
        Practice), Ljubljana, Institute for Development and Strategic Analysis.
Pattison, D., 2021: *Fiction Notes: Believe in your Story.* https://www.darcypattison.com/picture-books/
Pinto, G., Tarchi, C. & Bigozzi, L. (2020). Improving children's textual competence in kindergarten
        through genre awareness. *European Journal of Psychology of Educ*ation 35, 137–154.
        https://doi.org/10.1007/s10212-019-00418-8
Pinto, G., Tarchi, C. & Bigozzi, L. (2019). Promoting narrative competence in kindergarten: An
        intervention study. *Early Childhood Research Quarterly 47,* 20-29.
        https://doi.org/10.1016/j.ecresq.2018.09.003
Pulko, S. & Kranjec, E. (2020). 8. gradnik: Odziv na besedilo in tvorjenje besedil (The Eight
        Component: Response to the text and text formation). In D. Haramija (ed.), *Gradniki bralne
        pismenosti: teoretična izhodišča* (pp. 211–236). Maribor, Maribor University Press.
Saksida, I. (2017). Bralni dogodek v vrtcu (A reading event at nursery school). In D. Haramija (ed.),
        V objemu besed: razvijanje družinske pismenosti (pp. 47–54). Maribor, Maribor University Press.
Saksida, I. (2016). Dvogovorni bralni dogodek na visokošolski ravni (A bilingual reading event at a
        higher education level). In K. Aškerc (ed). *Izboljševanje kakovosti poučevanja in učenja v
        visokošolskem izobraževanju: od teorije k praksi, od prakse k teoriji* (pp. 232–238). Ljubljana: Centre
        of the Republic of Slovenia for Mobility and European Educational and Training
        Programmes https://www.cmepius.si/wp-content/uploads/2014/02/Monografija_projekt-
        EHEA_splet.pdf
Saksida, I. (1994). *Mladinska književnost med literarno vedo in književno didaktiko* (Youth Literature
        Between Literary Science and Literary Didactics). Maribor, Obzorja.
Sipe, L. (2001). Using Picturebooks to Teach Art History. *Studies in Art Education*, *42*(3), 197–213.
        https://doi.org/10.2307/1321037
Svetlik, K., Mršnik, S. & Rosc Leskovec, D. (2022): Spremljanje in merjenje ravni bralne pismenosti
        kot izziv in razvojna priložnost (Monitoring and assessing the levels of reading literacy as a
        challenge and development opportunity). In T. Krapše, J. Bone, A. Polšak in S. Mršnik (ur.),
        Pogled na šolo 21. stoletja v duhu kompetenc in pismenosti (pp. 134–158). Ljubljana: National
        Education Institute of Slovenia.
https://www.zrss.si/pdf/Pogled_na_solo_21_stoletja.pdf

Šek Mertük, P. & Cugmas, Z. (2020). 1. gradnik: Govor (The First Component: Speech). In D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (pp. 29–58). Maribor, Maribor University Press.

Tompkins, V. M., Farrar, J. & Montgomery D. E. (2019). Chapter Four – Speaking Your Mind: Language and Narrative in Young Children's Theory of Mind Development. In J. B. Benson (ed.), *Advances in Child Development and Behavior*, JAI, 56 (pp. 109–140). ISBN 9780128178867, https://doi.org/10.1016/bs.acdb.2018.11.003

Vogrinc, J. (2008). *Kvalitativno raziskovanje na pedagoškem področju* (Qualitative Research in the Pedagogical Field). Ljubljana, University of Ljubljana Faculty of Education.

Voršič, I. & Ropič Kop, M. (2020). 5. gradnik: Besedišče (The Fifth Component: Vocabulary). in D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (pp. 29–58). Maribor, Maribor University Press.

Vukelich, C., Enz, B., Roskos Kathleen A. & Kristie, J. (2019). Helping Young Children Learn Language and Literacy: Birth through Kindergarten. *Fifth Edition.* Boston, Pearson. https://collected.jcu.edu/fac_bib_2019/4

Zemljak Jontes, M. & Bednjički Rošer, B. (2020). 4. gradnik: Glasovno zavedanje (The Fourth Component: Phonetic awareness. In D. Haramija (ed.), *Gradniki bralne pismenosti: teoretična izhodišča* (pp. 107–136). Maribor, Maribor University Press.

Zupančič, T. (2017). Vloga kakovostne ilustracije v predšolskem obdobju (The role of quality illustrations in the preschool period). In D. Haramija (ed.), *V objemu besed: razvijanje družinske pismenosti* (pp. 39–46). Maribor, Maribor University Press.

The Comparison of the Prior Knowledge of First Grade Students regarding the Ability to Identify the Initial and Final Sounds, Name the Letters of the Alphabet, Read and Write

Marija Ropič Kop,[1] Nika Vizjak Puškar[2]

[1] University of Maribor, Faculty of Education, Maribor, Slovenia
marija.ropic@um.si
[2] Hearing and Speech Center Maribor, Maribor, Slovenia
nika.vizjak-puskar@csgm.si

The phonological awareness ability affects reading and writing. At the beginning of the 1st grade, students have various prior knowledge in the areas of phonological awareness, reading and writing. We wondered about the possible consequences in the field of children's literacy after the pandemic. The purpose of the empirical research was to assess and compare the prior knowledge of students at the beginning of the 1st grade before the systematic literacy instruction regarding the ability to identify the initial and final sounds in a word, perceive and name the letters of the alphabet, read words, write letters and words before and after the pandemic. We individually assessed 514 first-graders. The first group of students was assessed in 2017 and the second in 2023. Differences between groups of students were analysed using a t-test for independent samples. The results indicate that students' prior knowledge has been decreasing, therefore, changes are necessary.

University of Maribor Press

Primerjava zmožnosti zaznave začetnega in končnega glasu, poimenovanja črk abecede ter branja in pisanja učencev 1. razreda pred sistematičnim opismenjevanjem

Marija Ropič Kop,[1] Nika Vizjak Puškar [2]

[1] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
marija.ropic@um.si
[2] Center za sluh in govor Maribor, Maribor, Slovenija
nika.vizjak-puskar@csgm.si

Zmožnost glasovnega zavedanja vpliva na branje in pisanje. Na začetku 1. razreda imajo učenci različno predznanje na področju glasovnega zavedanja, branja in pisanja. Po pandemiji smo se spraševali o morebitnih posledicah, ki jih je ta pustila na področju pismenosti otrok. Namen empirične raziskave je bil preveriti in primerjati predznanje učencev na začetku 1. razreda pred sistematičnim opismenjevanjem na področju zmožnosti zaznavanja začetnih in končnih glasov v besedi, prepoznavanju in poimenovanju črk abecede, branju besed ter pisanju črk in besed pred pandemijo ter po njej. Individualno smo preverili predznanje 514 učencev 1. razreda. Oblikovali smo dve skupini. Prvo skupino učencev smo preverili v letu 2017, drugo pa v letu 2023. Razlike med skupinama učencev smo proučili s t-preizkusom za neodvisne vzorce. Izsledki raziskave so pokazali, da se predznanje učencev zmanjšuje, zato so nujne spremembe.

Univerzitetna založba
Univerze v Mariboru

1   Introduction

Children are constantly exposed to the press in their everyday life. A child who shows a greater interest in printed text will more often initiate joint reading, read familiar words, will more often observe printed texts in his environment, ask about the meaning of what is written, find out that what is spoken can be written down and then read. It is important that parents and educators make sure that they read various books (e.g. fairy tales, encyclopaedias, poetry) and provide pleasant experiences in reading in the preschool period of children, thereby ensuring early literacy in children (Strickland, 2011; Marjanovič Umek et al., 2020). A study (Paratore and Jordan, 2007) reports the positive effects of home-kindergarten and home-school partnerships because the work at home has a significant impact on some of the building blocks of reading literacy: vocabulary, narrative comprehension, phonological and phonemic awareness, responding to texts and producing texts (Haramija et al., 2020).

Phonological awareness affects reading and writing, so early learning of phonological awareness is recommended. The phonological awareness includes sensitivity to the sound structure of the language and the conscious ability to distinguish, combine and manage sound units of different sizes. Differences between phonological awareness skills based on word structure include whether the primary task is working with syllables, or beginnings of words, or rhymes, or sounds. A study (Anthony et al., 2006) found that phonological awareness is the best predictor of children's ability to distinguish writing from other activities (such as drawing).

Phonemic awareness is the highest level of phonological awareness and includes the ability to hear and identify the sounds in a word. It also includes identifying sounds in a word, manipulating sounds in a word, segmenting a word into sounds and merging sounds into words (Zorman, 2005).

Lonigan et al. (1998) note that the ability of phonological awareness generally increases with students' age. Anthony et al. (2006) found that older preschool children have a better developed latent ability of phonological awareness compared to younger ones.

The authors of researches (McGee & Ukrainetz, 2009; Mesmer & Griffith, 2005; Zorman, 2005, Manyak, 2008; Lonigan et al. & 2009; Strickland, 2011) emphasize the introduction of exercises to stimulate the level of phonological awareness in a playful way already in the preschool period or in kindergarten and continuing in the 1st grade of primary school. D. S. Strickland (2011) highlights the learning of phonological awareness as a key activity in reading development. He recommends that teachers use a specific strategy for training students in the tasks of naming various concrete objects or pictures, while students should pay attention to the spoken words at the level of individual levels of phonological awareness (initial sound, final sound, number of sounds in a word, breakdown of a word into individual sounds). Ongoing feedback and teacher's help are crucial in this process.

The individual levels of phonological awareness develop in a specific sequence based on complexity. Researches (Chard & Dickson, 1999; Ropič, 2016; Ropič, 2017; Ropič Kop, 2020; Ropič Kop & Klar Zadravec, 2021; Ropič Kop, 2022) confirm that the ability to identify the initial sound develops before the ability to identify the final sound. Research results (Levin, 2007; Ropič, 2016) show that the success of identifying the initial and final sounds in a word is influenced by monosyllabic and polysyllabic words, which is the length of the words, whether the initial sound of the word is a consonant or a vowel, whether the final sound of the word is a consonant or a vowel.

A research in which children aged five to five and a half were compared with those aged five and a half to six years is also interesting for our study. It was found that compared to younger children, older children were more successful in naming the final sounds in a word, naming capital letters, they were able to read more words, write more letters and words (Marjanovič Umek et al., 2020).

Students with a successfully developed ability to detect initial and final sounds read individual words already at the beginning of the first grade (Ropič Kop & Klar Zadravec, 2021; Ropič Kop, 2022; Ropič Kop & Klar Zadravec, 2022).

The study, based on the monitoring of preschool children up to the fourth grade of elementary school in the development of early literacy and later in the development of literacy, points to important facts. In early readers, compared to non-early readers,

M. Ropič Kop, N. Vizjak Puškar: The Comparison of the Prior Knowledge of First Grade
Students regarding the Ability to Identify the Initial and Final Sounds, Name the Letters of the
Alphabet, Read and Write

407

more successful phonological awareness skills were recorded. Literacy progressed
equally for everyone, but literacy development was faster for early readers than for
their peers (Tafa & Manolitsis, 2008).

Already in the pre-school period, we notice that children identify and name
individual letters. The authors of more modern studies (Liu et al., 2022; Clayton et
al., 2020) also note that naming letters significantly predicts reading and writing
words. Students who confidently read aloud the words identified as the most
challenging at the start of 1st grade had no difficulty reading easier words as well.
The study (Ropič Kop & Klar Zadravec, 2022) found a connection between the
ability to read words aloud in the first grade and reading aloud in the third grade,
namely, it is related to the time of reading aloud, to consideration of rhythm and
expressiveness, to the accuracy of reading, to oral answering to lower-level and
higher-level comprehension questions after reading aloud. Some researches (Gellert
& Elbro, 2017; Ropič Kop & Klar Zadravec, 2022) have found a reduced effect of
phonological awareness on reading in older students and also in reading more
demanding words.

Preschool children, especially children in a stimulating environment, are surrounded
by activities that encourage them to write spontaneously. Learning to write is a
challenging activity. What the child wants to write, he says out loud or in his mind,
which is why we say that writing is the conversion of sounds into letters. Individual
sounds are strongly connected in syllables and therefore more difficult to identify,
distinguish and parse. Some sounds have a short pronunciation, others have a
prolonged pronunciation. All this affects the conversion of sounds into letters.
Students learn about letters and sounds in monographic procedures for teaching
letters in the first grade i.e. in the systematic literacy instruction (Križaj Ortar et al.,
2000). Mirror writing is most often noticed in students at the beginning of the first
grade, so it is very important that the teacher instructs the correct writing direction
when teaching letters.

One of the largest international surveys in the field of education is PISA. The results
of the latest survey conducted in 2022 show a negative trend in reading literacy in
Slovenia and are below the average of OECD member countries. A Finnish study
(Manu et al., 2021) studied and confirmed on a sample of 1010 children the

correlation between pre-reading skills (letter naming, phonological awareness, vocabulary, listening comprehension) of children in kindergarten (6 years) and reading comprehension in the 9th grade (15 years).

When entering primary school, there are differences in children's skills, which should be reduced through education. We are interested in the state of prior knowledge of students at the beginning of the first grade. The aim of our empirical research was to test and compare the prior knowledge of students at the beginning of the first grade before the systematic literacy instruction regarding the ability to identify initial and final sounds in a word, recognize and name letters of the alphabet, read words, write letters and words. To obtain the most realistic situation possible in this area, we chose a sample size that we could individually verify ourselves. We formed two groups. The prior knowledge of group G 1 was tested in 2017, when the Curriculum from 2011 was binding for teachers. In 2018, the Curriculum was updated. Here we must emphasize that all students attended the first grade for only one month. In group G 2, we tested the prior knowledge in 2023. The Curriculum for Kindergartens (1999) was relevant for work in kindergarten. We used the same instruments to test the prior knowledge of the students of both groups.

Mainly because of the pandemic in the meantime when primary schools and kindergartens functioned differently than they used to, we hypothesized that at the beginning of the first grade, students will demonstrate lower abilities in identifying the initial and final sounds in a word, recognizing and naming the letters of the alphabet, reading words, writing capital letters and words with capital letters on the prior knowledge test in 2023.

2   Method

We tested 514 students individually. There were 256 first graders in group 1 (G 1) and 258 first graders in group 2 (G 2). Students G 1 and G 2 differed significantly in that a period of six years had passed between the prior knowledge testing of one group and the other, and different Curricula (2011, 2018) applied to them in primary school, even if only for one month. Moreover, we must not overlook the fact that, during a certain interim period, we experienced a pandemic that significantly altered life and work in Slovenia and, to some extent, affected the students of G2.

M. Ropič Kop, N. Vizjak Puškar: The Comparison of the Prior Knowledge of First Grade Students regarding the Ability to Identify the Initial and Final Sounds, Name the Letters of the Alphabet, Read and Write

409

To test the ability to identify the initial and final sounds in a word, we used sixteen pictures that the students first named. This allowed us to avoid difficulties (e.g. when identifying the final sound, a problem may arise due to using different names for images in case of diminutives – mi**š**, mišk**a**). The student received one point for each appropriate initial/final sound in the word, namely he/she could score a maximum of 16 points in the task of identifying the initial sound in the words and also a maximum of 16 points in the task of identifying the final sound in the words.

In the continuation of the test, they identified and named 25 capital letters of the Slovenian alphabet, which were not written in the regular sequence. The capital letters of the alphabet were written on a sheet of paper. The students received one point for each correctly named capital letter. They could score a maximum of 25 points.

If they knew at least some capital letters, we offered them to read 16 words written in capital letters. We arranged the words according to difficulty level from easier i.e. monosyllabic words to complex words. They read the words aloud. The students received one point for each word read correctly. They could score a maximum of 16 points in this task.

The students wrote four capital letters by dictation. The letters were an integral part of various strokes (vertical, horizontal and oblique line, semicircle, arc, etc.). They wrote on an unlimited surface. When writing letters, the correct shape of the letter was important, not the size of the individual parts of the letter. When writing capital letters, the students could score a maximum of 4 points.

If they were at least partially successful in writing letters, we dictated four more words, which followed each other in difficulty level. Two words were monosyllabic and two were compound. For writing capital letters in words, we followed the same criteria as in the previous task of writing letters. The students could score a maximum of 4 points when writing words in capital letters.

In both tasks, both when writing capital letters and when writing words with capital letters, we observed students' mirror writing. If the student mirrored at least one of the mentioned letters, we marked it with 1. If we did not find mirror writing in the student, we marked it with 0.

For the analysis of differences between groups of first-grade students in the ability to identify the initial and final sounds in a word, recognize and name letters of the alphabet, read words, write letters and words, and the presence of mirror writing when writing capital letters, we used the t-test for independent samples. The obtained data were processed with the software tool IBM SPSS Statistics 29. The results are presented in tables and interpreted.

3   Results

Table 1 presents the results of a t-test for independent samples showing no statistically significant difference (P = 0.115) in the ability to identify the initial sound between the groups of students at the beginning of the 1st grade before systematic literacy instruction. There is no great difference in the arithmetic mean of the two groups, namely in G 1 they detected 12.24 and in G 2 12.86 initial sounds in a word out of sixteen words. A significant difference in the standard deviation of G 1 and G 2 was also not recorded, nevertheless, it showed big individual differences between students in the ability to identify the initial sound. The obtained results prove that the ability to identify the initial sound in first grade students (G 1, G 2) is approximately equally developed in the same period of the school year, although six years have passed between the examination of the prior knowledge of G 1 and G 2students.

Table 1: Comparison of achievements in the identification of the initial sound in words of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	12.24	4.68	1.865 (0.173)	1.579 (0.115)
G 2	258	12.86	4.31		

Table 2 shows the results of the identification of the final sound in words. The t-test for independent samples does not show a statistically significant difference (P = 0.808) between the groups of first graders in the ability to identify the final sound in

a word. When comparing the achievements of the arithmetic averages of the students of both groups, we note a slightly greater success of G 1 students in the ability to identify the final sound in a word, namely by 0.13 compared to their peers after six years. We also notice in the comparison of the standard deviation of the two groups that it is slightly increased in G 2 (SD = 6.15) compared to G 1 (SD = 5.83). The standard deviation points to big individual differences between the students of the two groups. The students' ability to identify the final sound in a word is approximately equally developed at the beginning of the first grade of primary school in G 1 and in G 2, which means that we do not record a significant difference, even though the intervening period of six years had passed.

Table 2: Comparison of achievements in the identification of the final sound in words of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	7.54	5.83	2.403 (0.122)	0.243 (0.808)
G 2	258	7.41	6.15		

The third table shows the results of the t-test for independent samples of students of groups G 1 and G 2, in which there is no statistically significant difference in recognizing and naming letters of the alphabet. We tested all 25 letters. The arithmetic means of G 1 and G 2 indicate a smaller difference in the recognition and naming of letters of the alphabet. The results show that years ago, G 1 students had recognized and named almost one letter of the alphabet more than G 2 students did. The standard deviation is the same in both groups and also indicates great individual differences between students.

Table 3: Comparison of achievements in recognizing and naming letters of the alphabet of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	16.61	8.42	0.001 (0.969)	1.045 (0.297)
G 2	258	15.83	8.42		

The results of the independent samples t-test in Table 4 show a statistically significant difference (P = 0.004) in word reading ability between the groups of first graders before the systematic literacy instruction. G 1 students had read an average of 5.34 words out of sixteen, while their peers in G 2 only read 3.79 words. In G 1

we note a larger standard deviation (SD = 6.29) compared to the standard deviation in G 2. We found large individual differences in both groups.

Table 4: Comparison of word reading achievements of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	5.34	6.29	10.427 (0.001)	2.897 (0.004 *)
G 2	258	3.79	5.82		

The results of the t-test for independent samples of students of groups G 1 and G 2 in writing letters (Table 5) do not show a statistically significant difference between the groups. There is, however, a tendency to show a more successful writing of dictated four letters in G 1 compared to G 2. The standard deviation in the compared groups is exactly the same and high in both groups. We find that there are greater differences between students in writing letters before the systematic literacy instruction.

Table 5: Comparison of writing achievements of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	2.53	1.59	0.005 (0.942)	1.824 (0.069)
G 2	258	2.28	1.59		

In Table 6, we do not find a statistically significant difference between the groups when comparing the writing of monosyllabic words. The arithmetic means show a better ability to write two monosyllabic words in group G 1 (M = 0.80) compared to G 2, where on average they wrote 0.69 words correctly. The standard deviation indicates great individual differences in both groups of students.

Table 6: Comparison of achievements in writing monosyllabic words of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	0.80	0.85	0.674 (0.412)	1.570 (0.117)
G 2	258	0.69	0.86		

The results of Table 7 do not show a statistically significant difference in the writing of two polysyllabic words between groups of students. The writing of dictated words was more challenging compared to the writing of monosyllabic words, as one dictated word consisted of two syllables and one of three syllables. In the arithmetic

mean of word writing, we do not notice major differences between G 1 and G 2 students. The standard deviation again points to great individual differences between the students of the two groups.

Table 7: Comparison of achievements in writing polysyllabic words of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	0.29	0.61	1.018 (0.313)	0.558 (0.577)
G 2	258	0.26	0.58		

Emerging literacy brings joy and satisfaction to writing, as well as certain difficulties. Children, then students at the beginning of the first grade, want to write. During this period, we notice problems in writing regarding the shape of strokes, the direction of strokes, the size of the letters, mirror writing etc. Table 8 shows the results of the mirror writing comparison, as this problem occurred most often in writing on both tests. The arithmetic means of the mirror writing of letters indicate the same proportion of students in both groups. We also find the same standard deviation in mirror writing between G 1 and G 2 students.

Table 8: Comparison of achievement in mirror writing of capital letters of G 1 and G 2 students.

Group	N	M	SD	F (p)	t (p)
G 1	256	0.23	0.42	0.218 (0,641) 0.234 (0.815)	
G 2	258	0.23	0.42		

4   Discussion

Our hypothesis is confirmed in the comparison of achievements in word reading. In this, there is a statistically significant difference, or the biggest difference between students. The students we tested in 2017 were more successful in the word reading ability. We have not proved statistically significant differences in the other items. G 2 students were slightly more successful in identifying the initial sound in a word. In the 2017 test, G 1 students were more successful in identifying the final sound, in recognizing and naming letters, in writing letters, in writing monosyllabic words, in writing multisyllabic words. We have not found any differences in mirror writing.

Teachers cannot significantly influence the ability of identifying the initial and final sounds in a word in one month, considering the Curriculum for Slovene (2011, 2018We assume that the Kindergarten Curriculum, especially in the second age period, should promote phonological awareness through play. This can be supported by the findings that older preschool children have a developed latent capacity for phonological awareness (Anthony et al., 2006), so we recommend encouraging the ability of phonological awareness in the preschool period through play. We can listen to the sounds of animals, means of transport, musical instruments, etc. We syllabize words with children using certain stimulation (e.g. we syllabize the word describing a picture and, in that, place the corresponding number of circles; when syllabizing the word, children clap and count the syllables, etc.). Using the name of a specific object in the playroom and in the yard of the kindergarten, we identify the initial sound in the word. Exercises are performed frequently and for a short time.

When comparing the achievements of students G 1 and G 2 in identifying the initial and final sounds in a word, we note that the students' abilities in identifying the final sound in a word are significantly reduced compared to the identification of initial sounds in a word. We also note poorer identification of final sounds in words in both groups of students, as it is a more demanding ability, which is also pointed out by other researches (Chard &Dickson, 1999; Ropič, 2017; Ropič Kop, 2020; Marjanovič Umek et al., 2020). Following the example of exercises to stimulate the ability to identify the initial sound in a word, we will identify the final sound in a word. This is a significantly more demanding ability, as it is more difficult for children to detect the last sound in a word. It takes a lot of practice. We also recommend practicing the enunciation of shorter words and words with a simple structure.

We are not surprised by the result in word reading. We can assume that during the pandemic, there were fewer opportunities for the favourable development of the aforementioned abilities in kindergarten. We are aware that reading, especially initial reading or combining sounds (letters) into a word, is a very demanding activity.

It is very difficult to justify the findings in writing letters by dictation. We note that the Kindergarten Curriculum (1999) was valid for kindergartens before the first and second test. In the interim period, we had a pandemic in the country, which certainly affected work in kindergarten and at home, as well as children's emerging literacy. We assume that there is an effect of the mentioned on the prior knowledge of children in kindergarten and students at the beginning of the first grade in writing letters and writing words.

5   Conclusion

By analysing the characteristics of differences between groups of first-grade students in the ability to identify the initial and final sounds in a word, recognize and name letters of the alphabet, read words, write letters and words, and the presence of mirror writing when writing capital letters in 2017 and 2023, we find that students' prior knowledge decreases.

We are aware of the limitation of our research, as it is not a representative sample. The instrument used to test students' prior knowledge of literacy at the beginning of the first grade had already been used in several generations of students for the needs of differentiation and individualization. We are satisfied with it. Despite everything, we think that it can be shortened in the instrument part that tests the reading of words. We would reduce the number of words to the same as when writing words, while maintaining the level of difficulty. With the aforementioned, we will also shorten the time of the test.

In support of our belief regarding the need to develop the phonological awareness through play in the preschool period, research findings emphasize that early readers have better phonological awareness abilities and their literacy development is faster compared to their peers. (Tafa & Manolitsis, 2008).

Perhaps the results of our research also reflect the powerlessness of parents to encourage activities that stimulate emerging literacy skills. It may be necessary to consider a partnership between kindergarten and parents and also between primary school and parents in simple exercises to promote phonological awareness and other activities that encourage basic literacy. Educators/teachers should devote more help

to parents as well. Some researchers (Paratore and Jordan, 2007) emphasize the positive effects of the aforementioned cooperation.

The conducted research primarily provided information on the state of students' prior knowledge upon entering primary school and was helpful to teachers in creating differentiation and individualization in classes. Also, our research pointed to certain problems in the mentioned area and has something in common with the results of the PISA survey. In our research, we found a poorer prior knowledge of literacy at the beginning of the first grade. PISA shows poorer reading literacy among fifteen-year-olds.

If we aim to achieve better outcomes in reading literacy across all grades of primary school, we need an effective Kindergarten Curriculum, as well as a Curriculum for Slovene language in the first educational period.

References

Anthony, J. L., Williams, J. M., McDonald, R., Corbitt-Shindler, D., Carlson, C. D. & Francis, D. J. (2006). Phonological Processing and Emergent Literacy in Spanish-speaking Preschool Children. *Annals of Dyslexia*, 56 (2), 239-270 http://dx.doi.org.ezproxy.lib.ukm.si/10.1007/s11881-006-0011-5.

Chard, D.J. & Dickson, S. V. (1999). Phonological awareness: Instructional and Assessment Guidelines. *Intervention in School and Clinic*, 34 (5), 261-270.

Clayton, F. J., West, G., Sears, C., Humle, C. & Lervag, A. (2022). A Longitudinal study of Early Reading Development: Letter-Sound Knowledge, Phoneme Awareness and RAN, but Not Letter-Sound Integration, predict variations in Reading Development. *Scientific Studies of Reading*, v24 n2 p91-107 2022. http://dx.doi.org.ezproxy.lib.ukm.si/10.1080/10888438.2019.1622546.

Gellert, Ana S. and Elbro, Carsten »Does a Dynamic Test of Phonological Awareness Predict Early Reading Difficulties? A Longitudinal Study from Kindergarten through Grade 1« *Journal of Learning Disabilities* 50 no. 3 (2017): 227-237. http://dx.doi.org.ezproxy.lib.ukm.si/10.1177/0022219415609185

Haramija, D. (ed.). (2020): *Building Blocks of Reading Literacy*. Univerza v Mariboru, Pedagoška fakulteta.

Kurikulum za vrtce (1999). Ljubljana: Ministrstvo za šolstvo, znanost in šport, ZRSŠ.

Levin, I. (2007). The role of Hebrew letter names in early literacy: The case of multiphonemic acrophonic names. *Journal of Experimental Child Psychology*, 98 (4), 193-216.

Liu, C., Chung, K. K. H. & Tang, P. M. (2022). Contributions of Orthographic Awareness, Letter Knowledge, and Patterning Skills to Chinese literacy skills and Arithmetic Competence. *Educational Psychology*, v42 n5 p530-548. http://dx.doi.org.ezproxy.lib.ukm.si/10.1080/014423410.2022.2060497.

Lonigan, C. J., Anthony, J. L., Phillips, B. M., Purpura, D. J., Wilson, S. B. & McQueen J. D. (2009). The Nature of Preschool Phonological Processing Abilities and Their Relations to

Vocabulary, General Cognitive Abilities, and Print Knowledge. *Journal of Educational Psychology*, 101 (2), 345-358. http://dx.doi.org.ezproxy.lib.ukm.si/10.1037/a0013837

Manu, M., Torppa, M., Eklund, K., Poikkeus, A., Lerkkanen, M. & Niemi, P. (2021). Kindergarten Pre-Reading Skills Predict Gradeb9 Reading Comprehension (PISA Reading) but Fail to Explain Gender Difference. Reading and Writing: An Interdisciplinary Jounal, v34 n3 p753-771.

Manyak, P.C. (2008). Phonemes in Use: Multiple Activities for a critical Process. *The reading Teacher*, 61 (8), 659-662.

Marjanovič Umek, L., Fekonja, U. & Hacin Beyazoglu, K. (2020). Zgodnja pismenost otrok: razvoj, spremljanje in spodbujanje. Založba Univerze v Ljubljani. DOI: https://doi.org/10.4312/9789610603993

McGee, L. M. & Ukrainetz, T. A. (2009). Using Scaffolding to Teach Phonemic Awareness in Preschool and Kindergarten. *The Reading Teacher*, 62 (7), 599-603.

Mesmer, H.A.E. & Griffith, P.L. (2005). Everybody's selling It-But Just What is Explicit,Systematic phonics Instruction? *The Readinh Teacher*, 59 (4), 366-376.

Paratore, J. R. & Jordan, G. (2007). Starting Out Together: A Home-School Partnership for Preschool and Beyond. *The Reading Teacher*, 60 (7), 694-696.

Ropič, M. (2016). Zmožnost zaznavanja začetnih in končnih glasov v nezložnih in večzložnih besedah. *Pedagoška obzorja: časopis za didaktiko in metodiko*. l. 31, [št.] 1, str. 44-54.

Ropič, M. (2017). Razvoj določenih ravni glasovnega zavedanja v predšolskem obdobju. V: Haramija, D. (ur.). *Bralna pismenost v predšolski vzgoji in izobraževanju*. 1. izd. Maribor: Univerzitetna založba Univerze. Str. 57-66.

Ropič Kop, M. (2020). The ability to perceive initial and final sounds in a word. V: Lipovec, A. (ur.), Batič, J. (ur.), Kranjec, E. (ur.). *New horizons in subject-specific education: research aspects of subjects specific didactics*. 1st ed. Maribor: University Press: Faculty of Education,. Str. 53-69, tabele. ISBN 978-961-286-3586. https://press.um.si/index.php/ump/catalog/view/481/590/980-1.

Ropič Kop, M. & Klar Zadravec, S. Zmožnost učencev v branju besed v začetku 1. razreda. V: Žagar, Igor Ž. (ur.), Mlekuž, Ana (ur.). *Raziskovanje v vzgoji in izobraževanju: medsebojni vplivi raziskovanja in prakse : [večavtorska znanstvena monografija]*. Brezplačna elektronska izd. Ljubljana: Pedagoški inštitut, 2021. Str. 43-58, 350-352, tabele. Digitalna knjižnica, Dissertationes, 41. https://www.pei.si/ISBN/978-961-270-339-4.pdf, DOI: 10.32320/978-961- 270-339-4 . 43-58.

Ropič Kop, M. (2022). Correlations and regression of the initial and final sound on reading words in the Slovenian language. *Revija za elementarno izobraževanje*. izd.]. 15, št. 3, str. 357-375, tabele. https://journals.um.si/index.php/education/article/view/2408, http://www.dlib.si/details/ URN:NBN:SI:doc-X4MZNK04, DOI: 10.18690/rei.15.3.357-375.2022.

Ropič Kop, M. & Klar Zadravec, S. (2022). Učinek branja besed na branje neumetnostnega besedila in bralno razumevanje. V: Mlekuž, Ana (ur.), Žagar, Igor Ž. (ur.). *Raziskovanje v vzgoji in izobraževanju : učenje in poučevanje na daljavo – izkušnje, problemi, perspektive : [znanstvena monografija = scientific monograph]*. Ljubljana: Pedagoški inštitut. Str. 49-65, 181-182, tabele. Digitalna knjižnica, Dissertationes, 43. https://www.pei.si/ISBN/978-961-270-343-1.pdf.

Strickland, Dorothy S. (2011). Strategies for Beginning Readers and Writers and Those Needing Additional Support and Intervention in Teaching phonics Today. Newark, *DE: International Reading Association,* 50–56.

Tafa, E. & Manolitsis, G. (2008). A Longitudinal Literacy Profile of Greek Precocious Readers« *Reading Research Quarterly* 43 no. 2 165-185.

Učni načrt. Slovenščina. (2011). Ljubljana: Ministrstvo za šolstvo, znanost in šport, ZRSŠ.

Učni načrt. Slovenščina. (2018). Ljubljana: Ministrstvo za šolstvo, znanost in šport, ZRSŠ.

Zorman, A. (2005). Glasovno zavedanje in razvoj osnovne pismenosti v prvem, drugem/tujem jeziku. *Sodobna pedagogika. Posebna izdaja*. 24-45.

READING MOTIVATION AND READING INTERESTS OF PUPILS IN THE FINAL EDUCATIONAL PERIOD

ANA TUŠEK

Primary School Rovte, Logatec, Slovenija
anka.tusek@osrovte.si

When it comes to providing motivation for reading, it is important not only to select suitable texts, but also to examine them appropriately at the various levels of school reading: as part of regular literature lessons, required reading, the reading badge or other forms of reading activities. This study focuses on library use and reading of literature in the context of required reading and reading badges among pupils in the final educational period at a selected primary school. The results of the survey will help teachers of the Slovenian language to plan the reading syllabus and motivational reading activities in order to increase interest in literature, and to promote the development of a reading culture.

University of Maribor Press

BRALNA MOTIVACIJA IN BRALNI INTERESI UČENCEV ZADNJEGA VZGOJNO-IZOBRAŽEVALNEGA OBDOBJA

ANA TUŠEK
Osnovna šola Rovte, Logatec Slovenia
anka.tusek@osrovte.si

Pri motiviranju učencev za branje je poleg ustreznega izbora besedil pomembna tudi njihova ustrezna obravnava na različnih ravneh pouka: znotraj rednih ur književnosti, domačega branja, bralne značke ali drugih oblikah bralnih dejavnosti. Raziskava se posveča obiskovanju knjižnice ter branju leposlovja v sklopu domačega branja in bralne značke med učenci zadnjega vzgojno-izobraževalnega obdobja na izbrani osnovni šoli. Rezultati raziskave bodo pomagali učiteljem slovenščine pri načrtovanju kurikularnega branja in motivacijskih bralnih dejavnosti, s katerim bi povečali zanimanje za književnost in spodbujali razvoj bralne kulture

1   Introduction

Education plays a key social role in the formation of identities (Apple 2018, p. 31), and because children spend a large part of their time in school, the classroom has lasting effects on the development of attitudes and values in their lives. The goals of modern education are a broad general outlook and open-mindedness, the capacity to evaluate and act (Krek 2011: 27, UN 2018: 72), and there is a strong focus on the development of reading literacy at all levels of education. Due to its educational function, school is an important element in the process of socialisation of the individual, in which collective and individual value systems are built, including the reading culture and literacy. In the teaching of Slovenian, reading culture is developed through the study of literature, which is also the central subject of the didactics of young adult literature.

Reading literacy is a fundamental skill, a capacity that develops throughout life and permeates all human activities (Pečjak et al. 2019). It is a continuously developing ability of an individual, which includes developed reading skills, (critical) comprehension of what was read, conception of reading as a value, and motivation to read (Pečjak 2019: 3, GOV.si). For the development of reading ability and literacy, it is particularly important to systematically develop a culture of reading, i.e. reading as a cultural value (Pečjak 2021). This takes place in a long-term socialisation process within the family, school and society as a whole (Pečjak 2021: 470). Native language classes are primarily about developing literary competence, i.e. the internalized knowledge of the rules of literature (Culler 2008: 37), which enables students to receive and respond to literary texts and is developed through guided processes of literary reading (Grosman 2006, Žbogar 2014: 551). The level of its development also depends on the environment and one's own motivation to read. It is the wish of all those involved in the educational process and working in the field of reading education that pupils read as much as possible in their free time, as there are many proven positive effects of reading in all areas of children's development (cf. Haramija 2017, Kovač 2020).

The revised curriculum for the Slovenian language of 2018 as a core document for planning lessons in language and literature already follows modern guidelines and allows teachers a wide professional autonomy (cf. Ahačič et al. 2022). In line with modern concepts, it does prescribe compulsory authors in the final educational

period, but very few compulsory texts (UN 2018: 47), and provides the teacher with a great deal of freedom in the choice of literary texts to meet the objectives of the lesson. Equally important as the selection of texts is their appropriate guided reading or school interpretation, which should include discussion about what has been read. The criteria for the selection of literary texts are literary quality, appropriateness in terms of the level of personal and reading development of the pupils, an appropriate balance between Slovenian and world literature, a balance between canonical and contemporary literature, and an adequate representation of all three literary genres (UN 2018: 72, Haramija 2017: 24–25). The lessons focus on works of young adult literature, i.e. works intended primarily for readers up to the age of 18 (Saksida 2001: 405, Blažič 2011: 7). The general aims of literature lessons include developing a communicative ability and interest in reading, and the reader's ability to receive and respond to a literary text.

Through appropriate discussion, during which pupils can express their opinions about what they have read, the teacher can help to increase their reading motivation. Motivation is one of the key factors in the learning process and has a strong impact on the acquisition of knowledge and the sustainability of learning outcomes. It is a psychological process that involves the simultaneous action of various components, stimulating the learning process and then guiding it towards the final goal (Juriševič 2006). Although the elements of extrinsic motivation (recognition/achievement, competition with others, social motivation) are important for most pupils, only intrinsic motivation (a sense of reading competence, interest, engagement in reading, belief in the importance of reading) leads to longer-term goals, i.e. more frequent and lifelong reading, and greater reading and learning performance (Pečjak et al. 2006, in: Pečjak 2012). When studying texts, it is essential to begin with the real situation (Grosman 2006: 36). This involves considering the selection of texts – determining which texts are still relevant for today's pupils, or whether there are texts that are more relatable and can achieve the learning objectives. Simultaneously, it is crucial to think about adopting more suitable didactic approaches to enhance motivation for reading.

This does not mean complete freedom in the choice of texts, as teachers are bound by the curriculum, which highlights literature as particularly important in imparting national-cultural values. According to Kovač Šebart and Krek (2009: 76), education in public schools must be grounded in the values and norms of a particular society,

as well as the value base upon which teachers rely. This is also reflected in the literary canon of a particular country. The studying of texts from the literary canon, i.e. Slovenian and foreign literary classics, reinforces cultural, patriotic and civic education, as well as inter-cultural and broader social capacities (UN 2018: 6, cf. Kordigel Aberšek 2008: 19–23). These are texts that are distinguished by their aesthetic value and are important for general education as well as for the recognition of intertextual elements (cf. Haramija, Ivanuš Grmek 2020: 25–26). While opinions vary on the rationale for preserving the texts of the literary canon in literary education, a certain set of representative quality texts, acknowledged as such by society, is necessary. These texts form the framework for the development of literary reading and reception (Krakar Vogel 2001: 127).

From the aspect of taking reading interests into account to increase the motivation to read, it is crucial to be aware of the reader's development (discussed in detail by Appleyard 1991) and literary ability (Krakar Vogel 2020) when selecting appropriate texts. It is essential to take into account the pupil's maturity and cognitive development, while also considering the emotional side of experiencing texts. The latter is linked to the reader's previous experiences that will help them recognise the text as relevant (Kordigel Aberšek 2008: 19–20, cf. Grosman 2006: 96). In this context, Pečjak (2019) highlights the changed social context in which Generation Z is growing up. Personal experience plays a distinctly important role in adolescence (Žbogar 2014: 552), so when exploring texts that have personal value and interest for pupils, it makes sense to adopt an approach that encourages their own response and critical reception of the literary text (Grosman 2006: 33).

In the school context, Krakar Vogel mentions two forms of curricular reading, which are embodied in pedagogical communication: school literary reading in regular literature lessons, which includes required reading in addition to the texts discussed in class, and part-time or motivational reading, which includes reading as part of a reading badge or other reading activities (2016, 2022). While the possibilities for considering pupils' reading preferences in regular literature lessons are limited and meaningful only to a certain extent, the reading badge allows more freedom for pupils in their reading. The reading badge should include an individual discussion in which the pupil can articulate their own experience of what they have read. This is particularly important from the perspective of reception aesthetics and reader-response criticism (see Virk 1999: 215-224), wherein the (literary) text possesses

multiple meanings and only becomes concrete when in contact with the reader. Additionally, from the reading perspective, conversation serves as motivation for further reading. When reading for a reading badge, Grosman (2006: 165) points out that pupils expect enjoyable, interesting and non-committal forms of conversation that does not focus on predefined questions. It is important, especially from the young reader's point of view, that their encounter with a literary text is a pleasant experience (Kordigel Aberšek 2008: 17). However, as this is an optional, non-compulsory activity, which fewer and fewer pupils choose to take part in during their free time towards the end of primary school, we need to think about how to increase the number of participants in terms of motivation for reading – both in the reading badge and in other semi-leisure reading activities. School libraries can also play a major role in this, as places with a wide range of reading materials and activities for young readers (Schultz 2015), especially if there is a proper liaison between the school librarian and the teacher of the Slovenian language.

Although the Slovenian language has proverbially been regarded as an unpopular school subject, Brglez et al. (2008) have refuted this common belief in a study commissioned by the Slovenian Language Division (later renamed into Slovenian Language Service) operating under the Ministry of Culture of the Republic of Slovenia. When it comes to school assignments or ways of assessing knowledge, older primary school pupils prioritise tasks that can be done orally (oral performance) and that can be worked on at home (required reading).

Despite the wealth of research on reading literacy, reading interests and motivation, there is little on the reading badge or other forms of (semi-)selective reading. Apart from small-scale research conducted by individual students as part of their diploma and master's theses, the most relevant research in this area is the three-year study by T. Jamnik et al. (2008) on forms of long-term motivation for reading in the context of the reading badge. Its results reveal different aspects of the reading badge and open up avenues for further research, such as the study presented in this paper.

1.1   Research aim

The main aim of the survey was to obtain the pupils' opinions on all three of these areas of importance in promoting reading, and to assess, based on the results, which activities could serve as examples of good practice. The pupils' responses provide

valuable information for the school staff in further planning of reading activities, while examples of good practice can be used by others in their own work.

The research was carried out in a small rural school and focused on three important aspects of motivation for reading: visiting the school library, participating in the reading badge and pupils' perceptions of required reading. We were interested in the frequency of and reasons for visiting the school library, the reading interests of the pupils and their opinion on the motivational activities carried out in the library. With regard to the reading badge, we were particularly interested in the reasons why pupils either choose to take part in the reading badge or not, and in the ways of checking what they have read. In the section on required reading, the pupils expressed their agreement with statements that related to the pupils' informally expressed views on required reading in previous years. We also wanted to find out which ways of checking what was read as part of required reading were most familiar to pupils, and to get information on which books they would like to read. In all three areas, we were particularly interested in the differences among the pupils in terms of gender and grade.

2   Method

2.1   Participants

The survey was conducted at the Osnovna šola Rovte primary school and involved 91 pupils in the third educational period, of which 52% were girls and 48% boys. Participation in the survey was voluntary, opted for by all pupils (100% response rate), and the questionnaire was administered during regular Slovenian language lessons in January 2024. The questionnaire was designed using the 1ka online tool.

2.2   Procedure and research instrument

The questionnaire consisted of 21 questions covering three areas in addition to demographic data (gender, grade): school library attendance, reading for the reading badge, and required reading. For questions relating to library use, the pupils selected answers from various options (frequency of visiting, reasons for visiting), expressed agreement or disagreement with statements about the school library, and provided responses to questions regarding what they approve of, what they dislike, and what

suggestions they have. They also selected their preferred types/genres of text to read and expressed their opinion on the existing motivational activities in the library using a three-point scale. Some of the questions on the reading badge were multiple choice (reasons for participation/non-participation, favourite way of checking what they had read), asking respondents to justify their choice. Regarding required reading, pupils expressed agreement or disagreement with statements that represented the most frequent remarks made by pupils about required reading in their school. They then selected from among the available methods of checking and assessing what they have read for required reading, commented on the meaningfulness of required reading, expressed their preferences about the books suggested for reading, and cited the book that had impressed them the most so far in their required reading.

3   Results

According to the responses, approximately the same proportion of pupils visit the library every day (32%), once or twice a week (31%) or less than once a week (37%), but a closer analysis shows that the frequency of visits decreases over the years: while 58% of seventh-graders visit the library every day, only 12% of eighth-graders and 14% of ninth-graders do so. At the same time, 54% of eighth-graders and 64% of ninth-graders visit the library less than once a week. Girls visit the library more often than boys; in the overall sample, 55% of girls and 45% of boys are daily visitors.

As expected, the main reason for visiting the library is to borrow books for required reading and the reading badge (33% of responses), but many pupils also come to socialise with friends and for other reasons (reading magazines, playing board games and relaxing on the sofa).
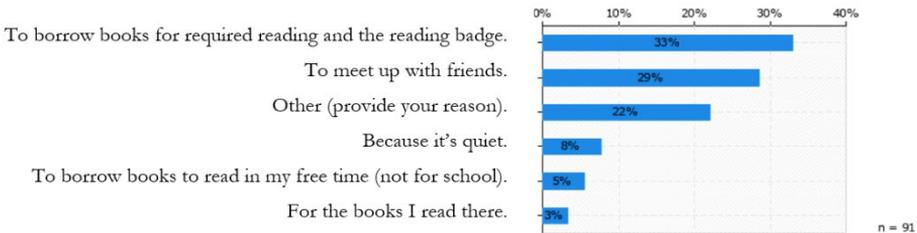
**Graph 1: Reasons for visiting the school library (n = 91)**

Next, the pupils commented on the statements about the school library. As evident from Graph 2, pupils are the least satisfied with the size of the space in which the library is located, while they rate the clarity of the layout of the library materials, the accessibility of the materials (opening hours) and the stock of interesting books as the best among all the variables.

Statement	Agree	Disagree
The school library has plenty of interesting books.	68%	32%
The school library has plenty of interesting magazines.	54%	46%
The school library is big enough.	34%	66%
The school library opening hours suit me.	76%	24%
The books in the school library are arranged clearly.	82%	18%
Interesting additional activities are taking place in the library.	58%	42%

n = 91

Graph 2: Pupils' agreement/disagreement with the statements about the school library (n = 91)

All of the above was also highlighted as positive later on in the questionnaire, when providing their own responses, which also emphasised the importance of a relaxed atmosphere and an accepting environment, which can be best provided by a librarian. On the other hand, the answers below underlined the need for a larger space that would also enable studying and more quiet. The pupils' suggestions for improving library activities at school included: more copies of books for required reading, additional (prize-winning) activities and a wider selection of books (especially comics and genre literature). It is interesting to note that in all grades, girls expressed a greater need for the library as a quiet space, while only boys wanted computers in the library.

From a gender perspective, the results relating to reading interests are particularly interesting and are depicted in Graph 3. The pupils could choose up to three responses to the question *'Which books do you like to read?'*. Adventure and romance books and comics received the highest number of responses, but the proportions differ slightly by gender.
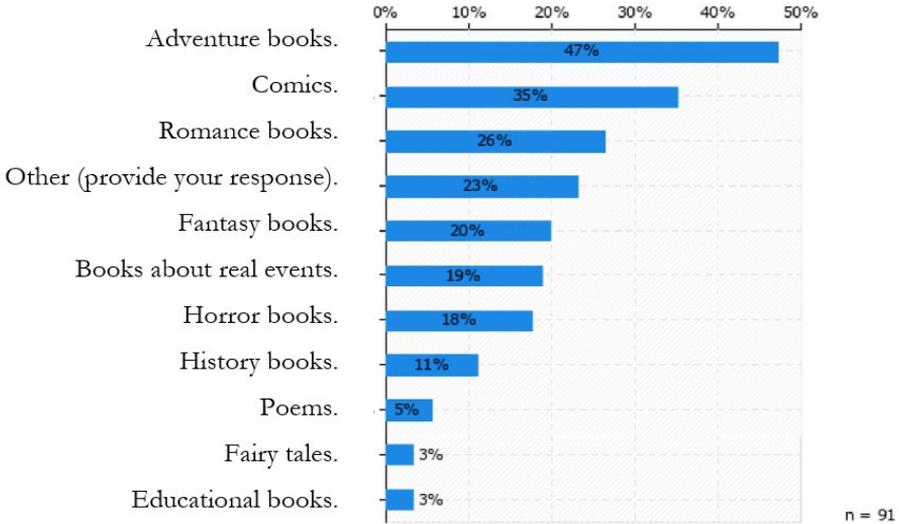
Graph 3: Reading interests of pupils (n = 91)

As the results show, all pupils like adventure books the most, but there is a noticeable gender difference. Girls rank romance books second among their favourite genres, while boys prefer comic books. There is also a difference with fantasy books, which are the third most popular among girls and only the fifth most popular among boys. Boys, however, rank books based on true events higher, whereas they are only sixth in popularity among girls.

Many pupils also choose to visit the school library because of external motivating factors, such as activities organised by the school librarian. Among the activities that take place in the school library in question, the most positively evaluated by pupils are reading to kindergarten children, visiting the book fair, quizzes, and a website where pupils can record their opinions about the books they have read and read the opinions of others. In addition to internal activities, we included a question about the Growing Up with a Book project, a national project of the Slovenian Book Agency aimed at promoting reading culture and reading Slovenian young adult literature, as we were interested in the pupils' opinions on it. It was rated most highly by the seventh-graders who were involved in the project this school year, despite the book being quite challenging in terms of content; only 8% had a negative opinion of it, which proves that the project is worthwhile and should be continued.

In continuation of the survey, we found that 36% of the pupils in the final educational period of the primary school in question read books for their reading badge. The answers do not differ significantly by grade (30% of seventh- and ninth-graders and 40% of eighth-graders are participating in the reading badge), and there is no significant difference by gender: the same number of boys and girls are taking part in the reading badge. Among those who do not take part in the reading badge, the most frequent reason given was that they do not enjoy reading (38%) or they lack time and are too busy with their regular school work (31%). When asked what would persuade the non-readers to read for a reading badge, the most common answer was a reward – either in the form of a grade in the Slovenian language class, a trip, etc. The most frequently chosen answer by pupils participating in the reading badge was that they enjoy reading (33%), but many are also motivated by the opportunity to read books of their own choice (25%). A significant number of pupils (17%) also choose to participate for the reward in the form of a final event organised jointly by schools within the municipality.

With regard to the reading badge, we were also interested in the pupils' opinions on ways of checking what they have read. They chose among the options provided by the teachers at their school, with the most popular choice by far being a discussion with the teacher or librarian. Somewhat surprisingly, the most traditional method was ranked ahead of the otherwise very popular quizzes.
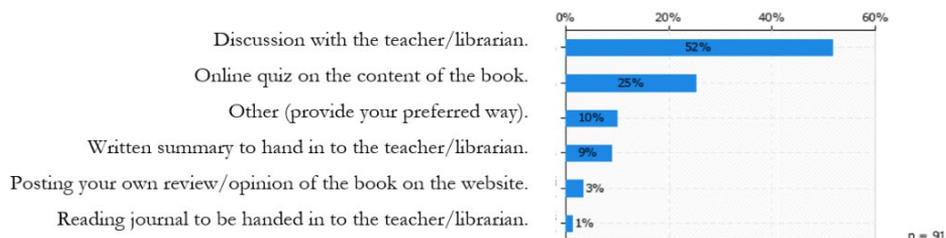
Graph 4: Preferred ways of checking what was read for the reading badge

The last set of questions was about required reading. In the final educational period, teachers of the Slovenian language put special emphasis on works by Slovenian authors. They choose classical texts of (mainly) Slovenian literature, which have remained the same for several years, along with works by contemporary Slovenian authors, which vary from year to year based on teachers' discretion and the library's

acquisition possibilities. The selection of texts for the 2023/2024 school year is shown in the table below.

Table 1: Required reading texts for the 2023/24 school year at the OŠ Rovte primary school

7th grade	8th grade	9th grade
A book of choice written by Desa Muck	I. Velikonja: Lestev do neba	I. Velikonja: Leto v znamenju polža / N. K. Lorenzutti: Gremo mi v tri krasne
T. Golob: Zlati zob / N. K. Lorenzutti: Avtobus ob treh / I. Velikonja: Normalna družina, pa kaj še!	R. Murnik: Lepi janičar / J. Jurčič: Jurij Kozjak	F. S. Finžgar: Pod svobodnim soncem / J. Jurčič: Rokovnjači
P. Voranc: Solzice	J. Jalen: Bobri / I. Sivec: Emonska lepotica	I. Cankar: Moje življenje
T. Pavček: Majnice	T. Pavček: Majhnice in majnice	N. Grafenauer: Skrivnosti
D. Defoe: Robinson Crusoe	J. Kersnik: Kmetske slike / I. Tavčar: Med gorami / I. Tavčar: Slike iz Loškega pogorja	I. Karlovšek: Matej / I. Sivec: Zadnji mega žur

In the survey, the pupils expressed their agreement or disagreement with the common statements related to the organisation of required reading at their school.
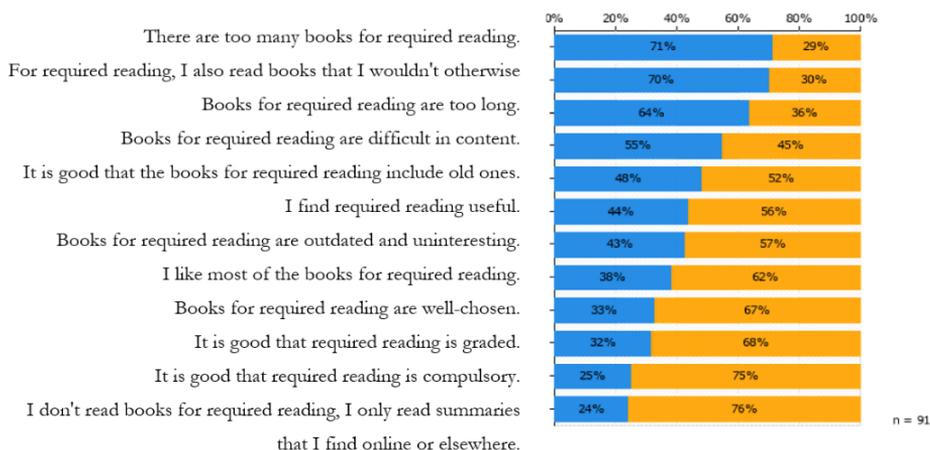
Graph 5: Pupils' opinions on various aspects of required reading (n = 91)

The answers showed that the pupils believe there are too many books (71% of the answers), which are overwhelming in content (64%) and difficult (55%). The majority agree that they also read books that they would not otherwise read as part of their required reading – which is compulsory (70%). Just under half of the pupils think it is good to read old books; a similar proportion of pupils find required reading useful (44%), but rate the books as old and uninteresting (43%). Three quarters of pupils think required reading should not be compulsory.

Among the preferred ways of assessing required reading, the most frequent choices were writing an essay and posting a critique on the library's website (18% of responses each). However, a significant number of pupils (38%) suggested alternative ways of simply checking what they had read. The most common of these were: discussing the book with a teacher or classmates, writing a summary, and checking what was read in the form of answering various questions or participating in a quiz. Many pupils explicitly mentioned that they believed required reading should not be graded.

Despite occasional negative opinions about required reading, almost half of the pupils (47%) find it meaningful. They recognise the importance of reading for learning, cognitive development, vocabulary expansion, etc. Many admit that required reading is precisely what motivates them to read at all.

In the final part of the survey, pupils suggested which books they would like to read as part of their required reading. The responses were (predictably) dominated by contemporary young adult novels, which cover a variety of topics relevant to teenagers, such as love, sexuality, and relationships. Pupils also expressed interest in crime novels, science fiction, fantasy and adventure books, and a desire to explore works of foreign authors, not just Slovenian ones. Additionally, they showed an inclination towards reading interesting educational books. They also want more freedom in their choice of books for required reading. Among the works they have read, the ones that have impressed them the most so far are mainly titles by contemporary young writers (I. Velikonja, N. K. Lorenzutti, I. Sivec). In contrast, only three pupils mentioned older literary works, such as *Pod svobodnim soncem*, *Jurij Kozjak*, and *Lepi janičar*.

4   Discussion

The survey results confirm many of the findings of experts in the field of reading literacy, and highlight both shortcomings and good practices in organising the three areas in question at school: library activities, reading badge and required reading.

Pupils' responses indicate a transformed perception of the school library. Over time, in the midst of societal changes, it has evolved from a place primarily for storing materials to an open space for reading, socialising, and accompanying activities. By offering a well-organised layout and engaging biblio-pedagogical activities to promote selected literature, the school librarian can inspire pupils to visit and read. This, in turn, makes a significant contribution to the development of reading literacy, linguistic competence, and critical thinking. While pupils still primarily visit the school library to borrow school materials, an almost equal proportion come to the library to meet friends, play board games, and enjoy the relaxed atmosphere. The results highlight the necessity for additional space where pupils can engage in various activities and feel comfortable. Despite space constraints, a school librarian can significantly contribute to greater well-being and comfort within the existing space by incorporating appropriate equipment such as sofas and seat cushions. As the results show, adventure books are the preferred choice among all pupils. This aligns with Appleyard's definition of the five stages in the development of a reader (Appleyard 1994, 13–15), wherein a child in this age range should assume the role of the reader as the hero and readily identify with literary figures who have similar experiences to themselves in the real world. However, during this period, particularly the more mature pupils have already reached the stage of the reader as a thinker. This results in significant individual differences in reading interests, as demonstrated by the present study, particularly in the comparison between girls and boys. Additional library activities for various groups of children are crucial in motivating pupils to visit the library and to read, and contribute to the diversity of experiences at both the library and school. The survey revealed that pupils have a particularly positive view of intergenerational reading (cooperation between school and kindergarten), as well as online activities (quizzes, a website for exchanging opinions on what they have read). It makes sense to continue with these activities. Online participation could be integrated into the reading badge and required reading to increase the motivation to read.

The results of the reading badge section of the survey confirmed the general observation of a decline in interest in reading in the final educational period. As many pupils cite a lack of time and being overloaded with school work as reasons for non-participation, it would be worth considering a reduction in the number of books pupils are asked to read by their mentor teachers. In the school in question, pupils are required to read five works of prose and learn one poem. According to the pupils' responses, a grade in the Slovenian language class or a school trip, combined with the option to choose their own book, would be sufficiently effective motivations for reading. The most popular way of checking what the pupils have read is to engage in discussions about the book. This aligns with the findings and recommendations of numerous reading and reading literacy researchers. Encouraging pupils to read and talk about what they have read, in addition to frequent reading in the classroom and teaching reading strategies, contributes to increased reading motivation among older primary school pupils. The use of a variety of materials and the possibility of selecting materials of their own choice also play an important role in this age group (Pečjak 2012, cf. Grosman 2006: 129, 163).

The pupils were the most critical when expressing their opinion on the organisation of required reading. When selecting literary works, the Slovenian language teachers follow the Slovenian language curriculum and professional recommendations, but subjective choices also play a significant role in the selection process. Although only part of the required reading is graded during the school year, pupils in the survey expressed their disagreement with any form of grading for their reading. One noteworthy comment came from a pupil who mentioned feeling consistently disappointed because, despite reading a book, he still receives poor grades. Instead of grading, pupils want to discuss the books they have read with the teacher or their classmates, even though they acknowledge that it is often the grade that motivates them to read the prescribed book. The pupils' responses suggest that, in the future, it would be beneficial to alter the organisation of required reading, particularly regarding the number and length of books. Additionally, allowing a bit more choice could be advantageous. It is noteworthy that pupils are well aware of the usefulness of required reading and the importance of familiarising themselves with the literary canon of their nation.

5   Conclusions

Reading is one of the most crucial skills an individual can acquire. Research confirms that well-developed reading skills are associated with better academic performance. These skills begin to develop from an early age, with both families and schools playing a major role in the process. It involves not only reading various texts but also literature, with the choice tailored to the individual's specific needs and interests. This becomes particularly important in the final period of primary education, when interest in reading tends to decline considerably. The school library, as a place of well-being and engaging motivational activities, well-organised required reading and the reading badge can actively contribute to the development of reading motivation. The research has unveiled the current situation in the final educational period of the selected primary school and the possibilities for more effective organisation of reading and other activities. This includes considerations of content (such as the selection of texts) and motivation (examining what practices work in reality).

We acknowledge that the survey sample is significantly too small for the popularisation of good practices and the generalisation of the results, given its limitation to a single primary school. A uniform survey across various areas is challenging because, just as school libraries differ, schools also organise required reading and the reading badge in varying ways. Hence, it makes more sense to focus on micro-levels, improving reading motivation within individual schools or even classrooms, and exploring the most effective ways that work in specific contexts.

The survey identified some areas for improvement, especially in the organisation of required reading and the reading badge, with a focus on the reading interests of adolescents. However, it also revealed activities that are well-received by pupils and make sense to continue.

References

Apple, M. W. (2018). Ali edukacija lahko spremeni družbo? in drugi spisi. Ljubljana: Pedagoška
     fakulteta.
Appleyard, J. A. (1994). *Becoming a reader: the experience of fiction from childhood to adulthood.* Cambridge:
     Cambridge university press.

Ahačič, K. idr. (2022). *Izhodišča za prenovo učnih načrtov v osnovni šoli in gimnaziji.* Elektronski vir. Ljubljana: Zavod Republike Slovenije za šolstvo. https://www.zrss.si/pdf/izhodisca_za_prenovo_UN.pdf

Blažič, M. M. (2011). *Branja mladinske književnosti: izbor člankov in razprav.* Ljubljana: Pedagoška fakulteta.

Brglez., A. idr. (2008). *Teza o (ne)priljubljenosti slovenščine kot obveznega šolskega predmeta v Sloveniji (raziskovalno poročilo).* Ljubljana: Inštitut za civilizacijo in kulturo. https://dokumen.tips/documents/teza-o-nepriljubljenosti-slovenscine-kot-obveznega-solskega-.html

Culler, J. D. (2008). *Literarna teorija: zelo kratek uvod.* Ljubljana: Krtina.

Grosman, M. (2006). *Razsežnosti branja: za boljšo bralno pismenost.* Ljubljana: Karantanija.

Haramija, D. (ur.) (2017). *V objemu besed: razvijanje družinske pismenosti.* https://press.um.si/index.php/ump/catalog/book/268

Haramija, D., Ivanuš Grmek, M. (2020). Gradniki bralne pismenosti. In: *Gradniki bralne pismenosti: teoretična izhodišča*, 5–28. https://press.um.si/index.php/ump/catalog/view/515/631/1148-2

Jamnik, T., Perko., M. (2008). razvoj bralnih zmožnosti z bralno značko.

nekaj pomembnejših ugotovitev. *Književnost v izobraževanju – cilji, vsebine, metode: simpozij Obdobja 25, 455–467.* https://centerslo.si/wp-content/uploads/2015/10/25-JamnikPerko.pdf

Jurišević, M. (2006). Učna motivacija in razlike med učenci. Ljubljana: Pedagoška fakulteta Univerze v Ljubljani.

Kordigel Aberšek, M. (2008). *Didaktika mladinske književnosti.* Ljubljana: Zavod Republike Slovenije za šolstvo.

Kovač, M. (2020). *Berem, da se poberem: 10 razlogov za branje knjig v digitalnih časih.* Ljubljana: Mladinska knjiga.

Kovač Šebart, M., Krek, J. (2009). *Vzgojna zasnova javne šole.* Ljubljana: Pedagoška fakulteta.

Krakar-Vogel, Boža (2001). Obravnavanje literarne klasike v sodobni šoli – na primeru Prešerna. *Jezik in slovstvo*, Vol. 46, No. 4, 125–136. https://www.dlib.si/stream/URN:NBN:SI:doc-WFWHBZ95/4834125b-bfec-4c45-a825-5f7b577fdc34/PDF

Krakar Vogel, B. (2016). Oblike kurikularnega branja literature. *Otrok in knjiga: revija za vprašanja mladinske književnosti, književne vzgoje in s knjigo povezanih medijev*, Vol. 43, No. 95, 2016, 5–16. http://www.dlib.si/stream/URN:NBN:SI:doc-MNIBPT47/44ecd4c7-f48f-4939-9b30-277eaa28b622/PDF

Krakar Vogel, B. (2020). *Didaktika književnosti pri pouku slovenščine.* Ljubljana: Rokus Klett.

Krakar Vogel, B. (2022). Vrste kurikularnega branja in odzivi kurikularnih bralcev. *Branje v slovenskem jeziku, literaturi in kulturi: 58. seminar slovenskega jezika, literature in kulture: 4.–15. 7. 2022*, 25–34. https://centerslo.si/wp-content/uploads/2022/06/58-SSJLK_Krakar-Vogel.pdf

Krek, J., Metljak, M. (ur.) (2011). *Bela knjiga o vzgoji in izobraževanju v Republiki Sloveniji 2011.* Ljubljana: Pedagoški inštitut.

Pečjak, S. (2012). *Psihološki vidiki bralne pismenosti: od teorije k praksi.* Ljubljana: Znanstvena založba Filozofske fakultete.

Pečjak, S. idr. (2019). Nacionalna strategija za razvoj bralne pismenosti za obdobje 2019–2030. https://www.gov.si/novice/2020-01-15-nacionalna-strategija-za-razvoj-bralne-pismenosti-za-obdobje-2019-2030

Pečjak, S. (2019). Pouk književnosti v osnovni in srednji šoli pri generaciji »Z« - psihološka perspektiva. *Jezik in slovstvo*, Vol. 64, No. 1.

Pečjak, S. (2021). Bralna kultura s psihološke in z vzgojno-izobraževalne perspektive. *Revija za elementarno izobraževanje = Journal of elementary education*, Vol. 14, No. 4, 461–483. http://www.dlib.si/stream/URN:NBN:SI:doc-B96MIV07/ae2a38f2-8dbe-4506-9e07-d1e1ea7dfc08/PDF

Saksida, Igor (2001). Mladinska književnost. V:Pogačnik, J. idr. *Slovenska književnost III.* Ljubljana: DZS.

Virk, T. (1999). Moderne metode literarne vede in njihove filozofsko teoretske osnove: metodologija 1. Ljubljana: Filozofska fakulteta, Oddelek za primerjalno književnost in literarno teorijo.

Žbogar, A. (2014). Literarno branje in mladostniki. *Recepcija slovenske književnosti: Simpozij Obdobja 33*, 551–557. https://centerslo.si/wp-content/uploads/2015/10/33-Zbogar.pdf

Innovatively Transforming Primary School EFL Writing: A Systematic Review of Studies

Hana Kuhar, Mihaela Brumen

University of Maribor, Faculty of Education, Maribor, Slovenia
hana.kuhar1@student.um.si, mihaela.brumen@um.si

The article provides a comprehensive analysis of research studies focusing on innovative teaching techniques for enhancing writing skills in English as a foreign language (EFL) among primary school students (aged 6–14 years). Particularly, it addresses the issue of underdeveloped writing proficiency among Slovenian students. The introduction discusses various challenges in developing primary school students' writing skills and presents modern techniques for successful writing development that have proven effective in English-speaking countries; which may be recommended for EFL instruction. The article introduces selective innovative teaching techniques—Shared Writing, Jigsaw Writing, Word Wall, and Storybird—for EFL writing, promising to improve writing skills while fostering students' creativity and engagement. Through a systematic literature review, the article offers insights into the effectiveness of these techniques and their implications for primary school EFL classrooms.

Inovativno preoblikovanje pisanja pri angleščini kot tujem jeziku v osnovni šoli: Sistematični pregled študij

Hana Kuhar, Mihaela brumen
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
hana.kuhar1@student.um.si, mihaela.brumen@um.si

V članku izpostavljamo celovit pregled študij, ki so osredotočene na inovativne učne tehnike za izboljšanje pisne zmožnosti v angleščini kot tujem jeziku med osnovnošolskimi učenci (starimi od 6 do 14 let), pri čemer obravnavamo slabše razvito pisno znanje slovenskih učencev. Uvodni del osvetli nekatere izzive pri razvoju pisne zmožnosti pri osnovnošolcih in predstavi izbrane inovativne tehnike za uspešen razvoj pisanja, ki so se izkazale za učinkovite v angleško govorečih državah in bi jih lahko priporočili tudi pri pouku tujega jezika. Za poučevanje pisanja pri angleščini kot tujem jeziku so predstavljene izbrane inovativne tehnike »skupnega pisanja« (ang. 'Shared Writing'), »sestavljanke« (ang. 'Jigsaw'), »besedne stene« (ang. 'Word Wall') ter uporaba platforme StoryBird, ki naj bi izboljšale pisno zmožnost učencev, hkrati pa spodbudile njihovo ustvarjalnost in angažiranost. Članek s sistematičnim pregledom literature ponuja vpogled v učinkovitost teh tehnik ter uporabnost pri pouku angleščine kot tujega jezika v osnovnošolskih učilnicah.

1   Introduction

As *lingua franca*, English serves across cultures and professions as a language of the interconnected world. Without complete knowledge of the English language, it can be highly challenging to communicate with global citizens. Speaking, listening, reading, and writing in English as a foreign language (hereinafter: EFL) transcend mere academic achievement – these four communication skills are a fundamental gateway to effective interaction with the (native) speakers of the language.

Among the quartet of language competencies, writing stands out as a higher-order thinking skill, demanding more extensive practice and experience compared to its counterparts (Kellogg, 2008; Klimova, 2013; Fareed et al., 2016), as it demands knowledge of grammar, spelling, sentence structure, and vocabulary alongside elements of creativity, organization, and imagination (Veramuthu & Shah, 2020). However, it is important to emphasize that both first language and EFL writing are complex and recursive intellectual processes; there are a few differences, especially when turning our thoughts into written words, which tends to be more difficult for non-native speakers (Silva, 1992; Cook & Bassetti, 2005; Manchón, Roca de Larios & Murphy, 2009) – EFL texts are shorter, less detailed, less developed, or use less figurative language than first language texts (Silva, 1992; Manchón et al., 2009).

For Slovenian students and teachers, the acquisition and teaching of writing skills in EFL are not only crucial for comprehensive language development but also for success in foreign language (hereinafter: FL) assessments on national exams, such as the National Assessment of Knowledge (NAK) for primary school pupils (aged 6– 14 years) and the Matura exam in secondary schools (at the age of 19). The performance in these two national exams has primarily highlighted the inadequately acquired FL writing proficiency in Slovenian students, particularly among primary school pupils (Letno poročilo NPZ, 2022).

Despite a limited focus on EFL writing in Slovenian EFL research (see Pižorn, 2013; Jashari & Dagarin Fojkar, 2019; Nagode, 2023), foreign scholars stress the underdeveloped EFL writing skills among primary school students. This issue is also overlooked in international comparative research, which concentrates on reading and listening (OECD Marconi's research from 2023 excludes writing).

Consequently, numerous approaches and techniques have been introduced to enhance EFL writing skills, improving performance and motivation among students and teachers, who play a pivotal role in encouraging writing (Bausch, 2010; Purnama, 2015), especially with young learners full of energy (McKay, 2006). Besides motivation, teachers' exploration of new ways of teaching also demands creative thinking "to find out the appropriate method in order to help students master those problems" (Bafadal & Rafika, 2015, p. 118).

The present article conducts a systematic literature review of selected innovative teaching techniques and approaches to develop writing skills in EFL among primary school pupils, which have demonstrated success in practice. The techniques, such as Shared Writing (Routman, 2005; Doubleday et al., 2015), Jigsaw writing (Aronson, 2008; Ardila, 2012; Bafadal & Rafika, 2015), Word Wall (Green, 2003; Wilker & Funk, 2008), digital platform StoryBird (Ramirez, 2013; Giacomini, 2015; Zakaria et al., 2016) and others, were initially designed for teaching writing in English as a first language (hereinafter: L1) and later adapted to teaching EFL. As such, they could be recommended as examples of good practice in EFL classes within primary schools. Based on these techniques, which address the fundamental needs of students and teachers, recommendations for the future development of EFL teaching methodologies will be provided.

While previous literature reviews on EFL writing (see Selveraj & Abdul Aziz, 2019; Palanisamy & Abdul Aziz, 2021; Karakuş, 2023) have provided valuable insights, their primary focus has been on secondary and tertiary levels (Selveraj & Abdul Aziz, 2019; Palanisamy & Abdul Aziz, 2021). However, the challenge of teaching writing should be addressed fundamentally within the context of primary education. Furthermore, although Karakuş (2023) offers suggestions for successfully teaching writing skills – leveraging technology, focusing on specific methods or strategies, and elucidating writing structure – our primary focus is on the evaluation of innovative techniques in primary EFL writing instruction, along with suggestions for their integration into primary EFL classrooms.

2   Theoretical Framework

Writing, essential in language acquisition, requires precision and effective communication (Fareed et al., 2016; Karakuş, 2023). Challenges in student writing, including motivation for writing, negative impacts from social media, inconsistent feedback, and large class sizes (Fareed et al., 2016), necessitate innovative methodologies for motivation, inclusivity, engagement, and collaborative learning (Chuang, 2014; Hornstra et al., 2014). Innovative techniques, such as paraphrasing and sequencing, uniquely engage learners and improve writing skills, fostering confidence (Kashinath & Raju, 2020). However, aligning teaching writing with students' interests remains a contemporary challenge for educators (Almazroa & Alotaibi, 2023; Eslit, 2023). Recent research (Kashinath & Raju, 2020; Eslit, 2023) suggests innovative writing techniques encompass interactive activities, technology, and personalized learning initiatives, ensuring diverse learning styles, cultivating critical thinking, collaborative skills, and active writing participation for enduring educational experiences.

In Slovenia, developing EFL writing skills in primary schools presents significant challenges due to orthographic differences between Slovenian and English, impacting students' phonological awareness and initial writing difficulties in EFL (Zorman, 2008; Skela et al., 2009). The discrepancy in phonemes – 44 in English compared to Slovenian's 29 – creates spelling challenges for Slovenian beginners in EFL (ibid.). To address this, Slovenian teachers emphasize sound-letter correlation, laying the foundation for students' understanding (Kokalj, 2019). Besides orthographic differences, Slovenian students also face difficulties transitioning from listening and speaking to reading and writing. These challenges include a lack of motivation for writing, exposure to different language inputs, difficulty internalizing the task types, misunderstandings regarding evaluating writing tasks, teachers' feedback (Pižorn, 2013) and their attitudes, and the general underdevelopment of learning strategies (Nagode, 2023). In such cases, didactics recommend integrating various teaching methods, techniques, and approaches to comprehensively impart EFL writing skills (Skela et al., 2009).

2.1   Selected Innovative Techniques for Teaching Writing in EFL

The selected techniques – Shared Writing, Jigsaw, Word Wall, and Storybird – have been chosen for their ability to promote collaborative writing, group activities, vocabulary integration, and creative storytelling, thus influencing students' writing process. Compared to other traditional writing techniques, these strategies actively engage primary school learners in the EFL writing process, allowing them to create model texts and collective stories. This engagement leads to improved individual writing performance and the development of critical thinking and collaborative skills.

"Shared writing is a collaborative method that builds upon the teacher-students' initial modelling of writing aloud, providing students with a scaffold to attempt their own successful writing" (Routman, 2005, p. 84). This adaptable method, suitable for pairs, groups, or whole classes, involves collaborative brainstorming, vocabulary selection, and concept development to create an ideal written composition (de Lange, Dippenaar & Anker, 2018). Together, a teacher and students interactively plan the structure, organize ideas, design content, and write the model text. After completing the first draft, both the teacher and students review the text, making improvements and revisions to produce the final version. Finally, students follow this model to create their own individual creative texts.

The Jigsaw technique is "a useful cooperative strategy enabling a group of learners to cover several topics simultaneously within a shorter amount of time" (Bafadal & Rafika, 2015, p. 118). It involves "dividing the class into competency groups (also known as home groups), where each group receives a list of subtopics to research. Individual members then collaborate with 'experts' from other groups to research deeper into the assigned subcategory. Afterward, they return to their home groups, taking on the role of instructor for their assigned subcategory" (Bafadal & Rafika, 2015, p. 121). This technique is beneficial for primary students as it promotes the development of diverse ideas for creating and writing a comprehensive text and encourages interactive collaboration among classmates. Through this process, young learners take on the responsibility of instructing their peers, and also learn how to use and write appropriate EFL vocabulary and grammar structures. In this manner, they enhance young learners' active engagement in the writing process.

"Word Wall is a collection of high-frequency sight words that are age appropriate, classified into groups or categories" (Sartika, 2017, p. 180), where words are displayed on a wall or whiteboards in large printing (Kusuma, 2021). Initially, this technique was designed for teaching vocabulary and reading (Jasmine & Schiesl, 2009) but was later transferred to teaching writing (Sartika, 2017).

Digital storytelling, particularly using platforms like Storybird, engages FL learners in using multimedia for the enhancement of their literacy skills, and it raises the question of the positive impact of digital tools on the writing process (Menezes, 2012; Wertz, 2014; Kazazoglu & Bilir, 2021). The digital platform Storybird "allows its users to write and publish their stories" and "enables getting feedback from teachers and experts" at the same time (Kazazoglu & Bilir, 2021, p. 44). The platform allows students to "write in different forms such as picture books, long-form stories, comics, flash fiction, poetry, and blogs" (ibid., p. 46), complementing the stories with visuals before publication.

3   Method

A systematic review includes diverse scholarly contributions published in educational journals and academic theses, focusing on teaching writing in EFL through innovative techniques. The review applied specific search criteria, targeting qualitative, quantitative, or mixed-method research designs published in English between 2010 and 2023, explicitly addressing writing skills enhancement in EFL, particularly within primary school settings. The review followed a systematic approach outlined by Impellizzeri and Bizzini (2012), involving six key stages: (1) defining the review question and eligibility criteria, (2) searching for studies, (3) selecting studies, (4) data extraction, (5) data synthesis, and (6) interpretation of results.

The primary search was conducted utilizing the electronic sources accessible through the University Library of Maribor, particularly databases such as Ebsco, WoS, SSCI, and Scopus, focusing on the keywords "innovative techniques in teaching English writing", "elementary school", "primary school", "English as a foreign language", "word wall teaching writing", "Jigsaw writing", "teaching shared writing", "digital platform Storybird writing". Since these databases found only a few relevant articles, the search was further extended to Google Web. The review focused on

information, including participants' age groups, the year of research, measured constructs, key findings, and recommendations from the retrieved studies.

The initial keyword search with basic filters across multiple databases – Ebsco, WoS, SSCI, Scopus – revealed 403 articles in total (94 articles on Innovative techniques, 84 articles on the Shared writing technique, 84 articles on the Storybird platform, 82 articles on the Word Wall technique, and 59 articles on the Jigsaw technique, all applied to teaching EFL for primary school students). After refining the search with specific keywords, the number of relevant articles decreased significantly to 29 (15 articles on Innovative techniques, 5 articles on the Jigsaw technique, 4 articles on the Shared writing technique and the Word Wall technique, and 1 article on the Storybird platform). After manual analysis, only 5 articles from the databases were found to be relevant. Further extending and limiting the research to Google Web (9 articles found) resulted in the finding of 14 relevant articles for this analysis.

4   Results

The outcomes are organized into chapters. Initially, an analytical presentation of research studies and academic theses will be presented in a table format, categorized into five thematic clusters: (1) the general use of innovative techniques, methods, and approaches for teaching EFL writing skills to primary school students, (2) Shared Writing as an innovative technique for teaching writing in EFL for primary school students, (3) Jigsaw writing as an innovative technique for teaching writing in EFL for primary school students, (4) Word Wall as an innovative technique for teaching writing in EFL for primary school students, and (5) Storybird platform as innovative technique for teaching writing in EFL for primary school students. Subsequently, a comprehensive discourse on the findings from these studies will be presented, providing a detailed analysis and discussion.

4.1   Table analysis of research studies and theses according to 5 thematic groups

Table 1: Analysis of research studies and diploma and master theses according to five thematic groups

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
General use of innovative techniques, methods, and approaches for teaching EFL writing skills to primary school students	Cole & Feng, 2015	Effective Strategies for Improving Writing Skills of Elementary English Language Learners	11 students	Investigating the validity of teaching techniques; A mixed method approach (experimental and control group, a student survey, a teacher survey, tests)	Findings suggest that by using technology, pre-taught vocabulary, teacher influences, and implementation of positive, diverse literacy practice, writing skills can be developed.	Authors suggest using journal writing, graphic organizers, teacher/peer conferencing, and focusing on expressing ideas rather than being critical of students' grammatical errors.
	Hussain, 2017	Teaching Writing to Second Language Learners: Bench-marking Strategies for Classroom	400 students, 160 EFL teachers (primary & secondary school)	Evaluating the writing skills of students in learning FL using techniques such as brainstorming, fable writing, speed writing, loop writing, and mini saga; a mixed method approach	The results revealed that teachers believe writing is the most difficult skill to teach, students in general are interested in FL writing, and the most popular technique among those presented was brainstorming, preferred techniques are also loop writing and narrating fables.	The author recommends using various techniques (among those presented) in teaching writing skills for EFL, such as brainstorming.

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
General use of innovative techniques, methods, and approaches for teaching EFL writing skills to primary school students	Yusuf, Jusoh & Yusuf, 2019	Cooperative Learning Strategies to Enhance Writing Skills among Second Language Learners	30 students	Investigating the impact of cooperative learning methods (specifically the jigsaw technique and student team achievement division) on improving students' writing skills; a quantitative research method (tests, experimental and control group)	Students' writing scores had increased from the pre-test to the post test after the implementation of the cooperative learning method.	Authors support implementation of this method in the classroom, as it promoted cooperation among students and reduces peer competition and promotes academic achievement and positive relationships.
	Lee & Wong, 2013	Bringing Innovation to EFL Writing: The Case of a Primary School in Hong Kong	450 students, 3 teachers who have been involved in the project	Evaluating the implementation of innovative techniques and method in teaching writing in EFL in comparison to traditional teaching methods; A mixed-methods approach (teacher interviews, student questionnaires, tests)	The change has brought improvements to students' motivation in learning writing and enhanced their performance.	Authors suggest using an innovative writing programme that incorporates writing as a process (from ideas to drafting and producing a final written piece) and genre (writing letters, diaries, etc.)

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
Shared Writing as an innovative technique for teaching writing in EFL	Antika, 2019 (Master Thesis)	The Effect of Applying Shared Writing Strategy to the Students' Writing Ability at Eighth Grade SMP Budisatrya Medan	120 students	Finding out the effect of applying shared writing strategy to the students' writing ability; quantitative research (experimental and control group, tests)	The research approved applying shared writing strategy to the students' writing ability.	The author suggests implementing the technique in classroom as the students evaluated it as more interesting, creative, and they were happier with their results.
	Al Zadjali, 2016	Shared writing in Omani Young Learner Classrooms	23 students and 23 EFL teachers	Exploring the effects of Shared writing practice in developing children's writing skills, and confidence when writing in the English language; small scale qualitative case study.	The findings revealed that the implementation of shared writing practice has contributed to the enhancement of children's writing speed, spelling, sentence structure, punctuation, and handwriting levels.	The author supports implementation of the technique in the classroom as it was proven to have a positive effect on teaching and students' writing skills.

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
Jigsaw writing an innovative technique for teaching writing in EFL	Mahdy, Ryhan & Hasn, 2018	The Effect of Jigsaw Technique on Enhancing EFL Intermediate Students' Writing Skill	60 students	Exploring the effect of using the jigsaw technique on students' writing achievement; quantitative research (experimental and control group, tests)	The results showed that the jigsaw technique is considered as more effective, useful, and favourable to teaching writing skills.	Teachers should use the technique with every communication skill, on all levels. However, they need to be well prepared and instructed in using the technique.
Jigsaw writing an innovative technique for teaching writing in EFL	Bafadal & Rafika, 2015	The Effect of the Jigsaw Technique in Teaching Writing Descriptive Texts	40 students	Experimenting with the effectiveness of the Jigsaw technique in teaching descriptive text writing; quasi-experimental research design	The research demonstrated the effectiveness of using the jigsaw technique in teaching writing.	The authors suggest the use of the technique; it was an enjoyable and suitable technique to teach writing.

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
	Mayrina, 2011 (Diploma Thesis)	Using Jigsaw Technique to Improve Students' Narrative Writing	35 students	Discovering the enhancement of students' narrative writing ability through the implementation of the Jigsaw technique; a qualitative research (interviews, questionnaires, checklists) and quantitative research (tests).	The study findings indicated that the Jigsaw technique was effective in enhancing the students' motivation and participation, leading to improved results in the writing test.	The author recommends implementing the technique in the classroom, emphasizing the active involvement of teachers. The technique can be further applied for teaching other skills as well.
	Abdullah, 2011	Effects of Jigsaw III Technique on Achievement in Written Expression	71 students	Comparing the impact of the Jigsaw technique with the instructional teacher-centred teaching method on students' academic success in written expressions; A mixed-methods approach (feedback, opinionnaire, pre-and post-tests)	The analysis of a written expression course showed that the experimental group outperformed the control group, with students having positive impressions of the Jigsaw technique.	The author prefers teaching writing using the jigsaw technique over the instructional teacher-centred teaching method and suggests its practical implementation.

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
Word Wall as an innovative technique for teaching writing in EFL	Saraswati, 2019 (Diploma Thesis)	The Effectiveness of using Word Wall Technique to Teach Writing a Recount Text	62 students	Evaluating the effectiveness of the word wall technique in improving students' writing achievement; quasi-experimental research	The word wall technique is effective for students to improve their achievement in writing.	Enjoyable learning environment in necessary. The author suggests using the technique as it helps students arrange their knowledge and memorize the words just by visual exposure.
	Amri & Sukmaningrum, 2023	Implementation of Wordwall as a Learning Media to Improve Students' Writing Skill	36 students	Examining the effectiveness of the Word Wall technique as a learning medium in enhancing students' writing skills; quantitative research (experimental and control group, tests)	The results showed that the experimental group had significant improvement in their writing in EFL.	Language teachers should consider using Wordwall as a learning tool to enhance their students' writing skills.

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
Storybird platform as an innovative technique for teaching writing in EFL	Shamsulbahri & Abdul Aziz, 2020	The Effectiveness of Storybird in Improving English Narrative Writing	8 students	Exploring the use of technology, especially digital storytelling websites; quantitative research (experimental and control group, tests)	The research findings indicate a positive improvement in students' written texts after using the Storybird platform, and it also increases proficiency levels, motivation, and interest in learning English.	The authors suggest exploring various digital tools and strategies in English teaching and learning for younger generations and promote the use of the Storybird platform.

Thematic groups	Authors, Year	Title	Participants	Measured Constructs/Variables and Measurement Instruments	Key Findings	Recommendation
Storybird platform as an innovative technique for teaching writing in EFL	Kazazoglu & Bilir, 2021	Digital Storytelling in L2 Writing: The Effectiveness of "Storybird Web 2.0 Tool"	6 students	Discovering the integration of the digital storytelling tool Storybird in EFL classrooms when teaching writing skills for Generation Z; qualitative research (pre- and post-questionnaires).	The results show that Storybird has a positive impact on the students' perspectives towards L2 writing.	Authors claim that Storybird can and should be used effectively as a digital tool for enhancing L2 writing in EFL classrooms.

4.2   Discussion of Analysis Findings

A total of 14 academic theses and scholarly articles were examined in detail, providing comprehensive insights into diverse aspects, including publication dates, participant demographics, measured variables, assessment tools employed, key observations, and recommendations.

The studies covered a range of research methods, categorized into qualitative (Al Zadjali, 2016; Kazazoglu & Bilir, 2021) and quantitative approaches (Mahdy, Ryhan & Hasn, 2018; Antika, 2019; Yusuf, Jusoh & Yusuf, 2019; Shamsulbahri & Abdul Aziz, 2020; Amri & Sukmaningrum, 2023); where the researchers tested the experimental and control groups and evaluated students' progress using pre- and post-tests after exposure to the innovative teaching techniques. Additionally, some studies adopted a mixed-method approach, combining quantitative experimental research with pre- and post-tests, followed by qualitative analysis through questionnaires or surveys (Abdullah, 2011; Mayrina, 2011; Lee & Wong, 2013; Cole & Feng, 2015; Hussain, 2017).

The scope of the studies primarily extended beyond Slovenian borders, with a predominant focus on Asian countries, including Indonesia (where education reforms have recently brought many scientific works in the EFL field; see Karakuş, 2023), Malaysia, Jakarta, Hong Kong, Kuala Lumpur, Philippines, and the Middle East – Saudi Arabia, Iraq and Oman, and Turkey.

The participants primarily consisted of EFL primary school learners (6–15 years old), occasionally including EFL teachers. The researchers mainly focused on assessing the effectiveness of the innovative techniques and methods, thus excluding parents and other pedagogical staff. The largest sample (450 students) was taken by Lee & Wong (2013), and the smallest (6) by Kazazoglu & Bilir (2021), which highlights the disparity in the number of students and brings forth the issue of generalizability, statistical power, and reliability when comparing the teaching techniques. The students were selected for a study because the researchers asked the EFL teachers to participate with their class (Mayrina, 2011; Bafadal & Rafika, 2015; Saraswati, 2019; Yusuf, Jusoh & Yusuf, 2019; Shamsulbahri & Abdul Aziz, 2020). Some researchers actively participated in the teaching process themselves (Cole & Feng, 2015), while others collaborated with a specific school, randomly selecting

participants within it (Abdullah, 2011; Antika, 2019). In contrast, some studies chose students and EFL teachers randomly, regardless of the school (Lee & Wong, 2013; Al Zadjali, 2016; Hussein, 2017; Mahdy, Ryhan & Hasn, 2018).

Numerous authors (see Lee & Wong, 2013; Bafadal & Rafika, 2015; Kazazoglu & Bilir, 2021, and others) agree on the importance of bringing creative teaching approaches into EFL classrooms, especially regarding writing skills. Studies focusing on specific techniques, such as shared writing (Al Zadjali, 2016; Antika, 2019), jigsaw writing (Abdullah, 2011; Mayrina, 2011; Bafadal & Rafika, 2015; Mahdy, Ryhan & Hasn, 2018), word wall (Saraswati, 2019; Amri & Sukmaningrum, 2023), and the digital platform Storybird (Shamsulbahri & Abdul Aziz, 2020; Kazazoglu & Bilir, 2021) recommend the use of technology, pre-taught vocabulary, brainstorming, graphic organizers, visual exposure aids, word memorization, journal writing, and teacher/peer conferencing due to their proven efficacy on students' writing speed, spelling, sentence structure, and confidence. Moreover, these techniques encourage collaborative, interactive learning and creativity, fostering a more interesting and engaging learning process. They help improve academic achievement and give more importance to ideas rather than focusing solely on correcting grammatical errors (Lee & Wong, 2013; Cole & Feng, 2015; Hussain, 2017; Yusuf & Jusoh & Yusuf, 2019).

However, certain authors (Mayrina, 2011; Mahdy, Ryhan & Hasn, 2018) highlight the challenges in their implementation, especially if teachers are not adequately trained or prepared for innovative approaches. They also stress that not all innovative techniques may be suitable for every learning environment, age group, or educational setting and suggest the potential for collaborative efforts among language teachers to share successful implementations of innovative techniques.

Ultimately, the synthesized findings from the studies support the theoretical framework, emphasizing the importance of selecting engaging and well-informed teaching techniques, fostering students' engagement and effectiveness in mastering the complex writing skill within the EFL context.

5   Conclusion

Developing writing skills in EFL contexts requires advanced cognitive abilities and extensive practice. This is particularly true in the Slovenian context, where mastering EFL writing skills is not only essential for comprehensive language development but also imperative for achieving desired outcomes in national language assessments.

A systematic literature review has examined the challenges of developing primary writing skills in EFL. The analysed studies introduce innovative writing techniques that foster diverse EFL literacy practices among primary school learners, including various learning styles and preferences. These techniques promote collaborative writing, creativity, and increase student motivation and participation, fostering a more interesting and engaging learning process. However, challenges such as lack of resources, inadequate technology or digital infrastructure, and insufficient teacher training may hinder the effective implementation of these techniques, especially among primary EFL teachers accustomed to traditional teaching methods. Therefore, we recommend the following strategies for advancing EFL teaching methodologies: conducting workshops for EFl teachers, encouraging feedback among teachers, promoting action research on selected techniques, and providing ongoing resources and support to EFL teachers.

Due to the scarcity of studies on EFL literacy practices in the primary school context, there is potential for further research to explore, improve, and adapt innovative EFL writing techniques based on teachers' feedback. Additionally, there is an opportunity for EFL teachers to collaborate and share successful applications of these techniques.

Despite potential challenges such as time planning, lack of teacher experience, technical support (especially for Storybird), classroom management, and assessment, we still recommend implementing selected innovative techniques in Slovenian EFL classrooms because of the benefits associated with student-centred teaching practices. Specifically, Slovenian EFL teachers are advised to implement Shared writing, Jigsaw, and Word wall techniques to establish the basic grounds for primary EFL writing – from phonemes to words, sentences, and longer texts, while encouraging active teacher involvement. Additionally, using the digital platform Storybird is encouraged to supplement learning by giving the students a higher

purpose in developing their writing skills, as digital tools have been shown to increase student motivation and enable long-term knowledge retention.

Acknowledgments

References

Abdullah, S. (2011). Effects of Jigsaw III Technique on Achievement in Written Expression. *Asia Pacific Education Review, 12*(3), 427–435.

Al Zadjali, F. H. (2016). Shared Writing in Omani Young Learner Classrooms. *Teaching EFL Writing in the 21st Century Arab World*, 69–98. doi:10.1057/978-1-137-46726-3_4

Almazroa, H., & Alotaibi, W. (2023). Teaching 21st Century Skills: Understanding the Depth and Width of the Challenges to Shape Proactive Teacher Education Programmes. *Sustainability, 15*, 1–25. doi:10.3390/su15097365

Amri, F., & Sukmaningrum, R. (2023). Implementation of Wordwall as a Learning Media to Improve Students' Writing Skills. *International Journal of Multidisciplinary Approach Research and Science, 1*(3), 495–502. doi:10.59653/ijmars.v1i03.255

Antika, L. S. (2019). *The Effect of Applying Shared Writing Strategy to the Students' Writing Ability at Eighth Grade SMP Budisatrya Medan.* [Master's thesis, University of Muhammadiyah Sumatera Utara Medan]. UMSU Repository.

Ardila, R. (2012). *Improving the Students' Ability in Writing Recount Text by Applying Jigsaw technique.* [Master's thesis, University of Medan]. UMSU Repository.

Aronson, E. (2008). *The Jigsaw Classroom.* New York: Social Psychology Network.

Bafadal, M. F., & Rafika (2015). The Effectiveness of the Jigsaw Technique in Teaching Writing Descriptive Text. *Linguistics and ELT Journal, 3*(1),117–136.

Bausch, L. S. (2010). The power of teachers' writing stories: Exploring multiple layers of reflective inquiry in writing process education. *Journal of Language and Literacy Education, 6*(1), 20–39.

Chuang, T. (2014). Increasing Learning Motivation and Student Engagement through the Technology-Supported Learning Environment. *Creative Education, 5,* 1969–1978. doi:10.4236/ce.2014.523221

Cole, J., & Feng, J. (2015). Effective Strategies for Improving Writing Skills of Elementary English Language Learners. *Chinese American Educational Research and Development Association Annual Conference*, (pp. 2–25).

Cook, V. J. & Bassetti, B. (2005). *Second Language Writing Systems.* Clevedon: Multilingual Matters.

de Lange, M., Dippenaar, A., & Anker, J. (2018). Shared writing as first phase in writing instruction of intermediate phase Afrikans home language learners. *Per Linguam, a Journal for Language Learning, 34*(1), 33–46. doi:10.5785/34-1-704

Doubleday, A. F., Brown B., Patston, P. A., Jurgens-Toepke, P., Strotman, M. D., Koerber, A., Haley, C., Briggs, C., & Knight G. W. (2015). Social Constructivism and Case-Writing for an integrated Curriculum. *Interdisciplinary Journal of Problem-Based Learning, 9*(1). doi:10.7771/1541-5015.1502

Eslit, E. R. (2023). *21st Century Teaching: Updates, Challenges, and Best Practices.* doi:10.13140/RG.2.2.21864.65284

Fareed, M., Ashraf, A., & Bilal, M. (2016). ESL Learners' Writing Skills: Problems, Factors and Suggestions. *Journal of Education and Social Sciences, 4*(2), 81–92.

Giacomini, L. (2015). Using »Storybird« in Young Learners' Creative Writing Class. *Teaching Techniques,* 35–37.

Green, J. (2003). *The Word Wall: Teaching Vocabulary through Immersion.* New York: Pippin Publishing.

Hornstra, L., van der Veen, I., Peetsma, T., & Volman, M. (2014). Innovative learning and developments in motivation and achievement in upper primary school. *Educational Psychology*, 1–36.

Hussain, S. S. (2017). Teaching Writing to Second Language Learners: Bench-marking Strategies for Classroom. *Arab World English Journal, 8*(2), 208–227. doi:10.24093/awej/vol8no2.15

Impellizzeri, F., & Bizzini, M. (2012). Systematic review and meta-analysis: a primer. *International Journal of Sports and Physical Therapy, 7*(5), 493–503.

Jashari, L. T., & Dagarin Fojkar, M. (2019). Teachers' Perceptions of Developing Writing Skills in the EFL Classroom. *ELOPE: English Language Overseas Perspectives and Enquiries, 16*(2). doi:10.4312/elope.16.2.77-90

Jasmine, J., & Schiesl, P. (2009). The Effects of Word Walls and Word Wall Activities on the Reading Fluency of First Grade Students. *A Journal of Literacy and Language Arts, 49*(4), 301–314.

Karakuş, G. (2023). Systematic Review of Studies on Writing in Elementary School. *Research in Pedagogy, 13*(1), 146–176. doi:10.5937/IstrPed2301146K

Kashinath, K., & Raju, R. (2020). Techniques and Strategies for Improving Writing Skills of High School Students. *Journal of Archaeology of Egypt/Egyptology, 17*(7), 7154–7160.

Kazazoglu, S., & Bilir, S. (2021). Digital Storytelling in L2 Writing: The Effectiveness of »Storybird Web 2.0 Tool«. *Turkish Online Journal of Educational Technology, 20*(2).

Kellogg, R. T. (2008). Training writing skills: A cognitive developmental perspective. *Journal of Writing Research, 1*(1), 1–26.

Klimova, B. F. (2013). Approaches to the teaching of writing skills. *International Conference on Education & Educational Psychology (ICEEPSY 2013).*

Kokalj, J. (2019). *Izkušnje učiteljev angleščine v 3. razredu z začetnim opismenjevanjem v angleščini kot tujem jeziku.* [Master's thesis, University of Ljubljana]. Repozitorij Univerze v Ljubljani.

Kusuma, F. N. (2021). *The implementation of word wall technique in teaching writing at SMPN 1 Kedunggalar ngawi.* [Master's thesis, State Institute of Islamic Studies Ponorogo]. IAIN Ponorogo.

Lee, I., & Wong, K. (2013). Bringing Innovation to EFL Writing: The Case of a Primary School in Hong Kong. *The Asia-Pacific Education Researcher, 23*, 159–163.

Letno poročilo NPZ. (2022). Državni izpitni center.

Mahdy, M. T., Ryhan, J. M., & Hasn, A. N. (2018). The Effect of Jigsaw Technique on Enhancing EFL Intermediate Students' Writing Skill. *Basic Education College Magazine For Educational and Humanities Sciences, 39*, 1498–1507.

Manchón, R. M., Roca de Larios, J., & Murphy, L. (2009). The temporal dimension and problem-solving nature of foreign language composing processes. Implications for theory. In R. M. Manchón (Ed.), *Writing in foreign language contexts: Learning, teaching, and research,* (pp. 102–129). Multilingual Matters.

Marconi, G. (2023). *OECD Education Working Papers No. 28: Does English instruction teach more reading than listening skills? Evidence from 15 European education systems.* doi:10.1787/19939019

Mayrina, I. (2011). *Using Jigsaw technique to improve students' narrative writing.* [Diploma thesis, Faculty of Tarbiyah and Teachers' Training Jakarta]. Institutional Repository UIN.

McKay, P. (2006). *Assessing Young Language Learners.* Cambridge: Cambridge University Press.

Menezes, H. (2012). Using Digital Storytelling to Improve Literacy Skills. *Proceedings of the IADIS International Conference on Cognition & Exploratory Learning in Digital Age*, pp. 299–301.

Nagode, P. G. (2023). The demographic factors affecting the writing skills in Slovenian Year 6 EFL Students. *ELOPE: English Language Overseas Perspectives and Enquiries, 20*(1), 187–201. doi:10.4312/elope.20.1.187-201

Palanisamy, S., & Abdul Aziz, A. (2021). Systematic Review: Challenges in Teaching Writing Skills for Upper Secondary in ESL Classrooms and Suggestions to overcome them. *Malaysian Journal of Social Sciences and Humanities, 6*(4), 262–275. doi:10.47405/mjssh.v6i4.749

Pižorn, K. (2013). Učinki učiteljeve povratne korektivne informacije pri razvijanju pisne zmožnosti v tujem jeziku. In V. Eržen (Ed.), *Razvijanje in vrednotenje znanja v gimnazijski praksi*, pp. 63–76. Ljubljana: Zavod RS za šolstvo.

Purnama, N. D. (2015). An investigation of teacher's role as facilitators in teaching writing in the classroom. *ELT Perspective, 3*(2), 361–370.

Ramirez, Y. E. (2013). Writing skill enhancement when creating narrative texts through the use of collaborative writing and the Storybird web 2.0 tool. *Colombian Applied Linguistics Journal, 15*(2), 166–183.

Routman, R. (2005). *Writing essentials: raising expectations and results while simplifying teaching.* Heineman.

Saraswati, R. (2019). *The Effectiveness of Using the Word Wall Technique to Teach Writing a Recount Text.* [Diploma thesis, Faculty of Languages and Arts Semarang]. Unnes.

Sartika, R. (2017). Implementing Word Wall Strategy in Teaching Writing Descriptive Text for Junior High School Students. *Journal of English and Education, 5*(2), 179–186.

Selveraj, M., & Abdul Aziz, A. (2019). Systematic Review: Approaches in Teaching Writing Skill in ESL Classrooms. *International Journal of Academic Research in Progressive Education and Development, 8*(4), 2226–6348. doi:10.6007/IJARPED/v8-i4/6564

Shamsulbahri, N. F., & Abdul Aziz, A. (2020). The Effectiveness of Storybird in Improving English Narrative Writing. *International Journal of Academic Research in Business & Social Sciences, 10*(2), 316–322. doi:10.6007/IJARBSS/v10-i2/6932

Silva, T. (1992). L1 vs L2 writing: ESL Graduate students' perceptions. *TESL Canada Journal, 10*(1), 27–47.

Skela, J., Sešek, U., & Dagarin Fojkar, M. (2009). Opismenjevanje v tujem/drugem jeziku na zgodnji stopnji. In K. Pižorn (Ed.), *Učenje in poučevanje dodatnih jezikov v otroštvu*, (pp. 220–241). Ljubljana: Zavod Republike Slovenije za šolstvo.

Veramutuhu, P., & Shah, P. M. (2020). Effectiveness of Collaborative Writing among Secondary School Students in an ESL Classroom. *Creative Education, 11*, 54–67. doi:10.4236/ce.2020.111004

Wertz, J. A. (2014). Bitstrips and Storybird: Writing Development in a Blended Literacy Camp. *Voices from the Middle, 21*, 24–32.

Wilker, J. F., & Funk, V. (2008). Using Word Wall Activities in Early Childhood Classrooms. *Journal of Educational Practices, 6*(1), 1–7. doi:10.15760/nwjte.2008.6.1.12

Yusuf, Q., Jusoh, Z., & Yusuf, Y. Q. (2019). Cooperative Learning Strategies to Enhance Writing Skills among Second Language Learners. *International Journal of Instruction, 12*(1), 1399–1412.

Zakaria, S. M., Yunus, M. M., Nazri N. M., & Shah, P. M. (2016). Students' Experience of Using Storybird in Writing ESL Narrative Text. *Creative Education, 7*, 2107–2120. doi:10.4236/ce.2016.715210

Zorman, A. (2008). Razvijanje osnovne pismenosti v drugem oziroma tretjem jeziku. In J. Skela (Ed.), *Učenje in poučevanje tujih jezikov na Slovenskem*, (pp. 239–259). Ljubljana: Tangram.

PHYSICAL EDUCATION
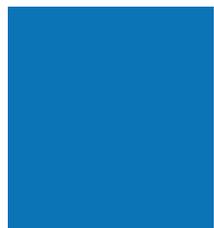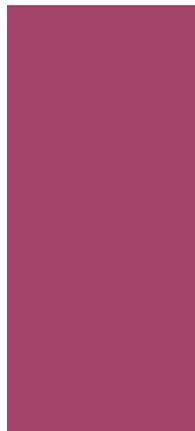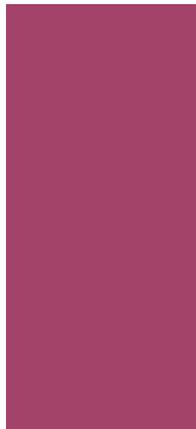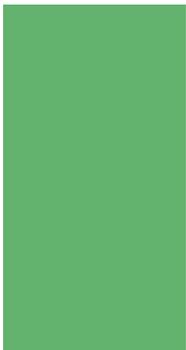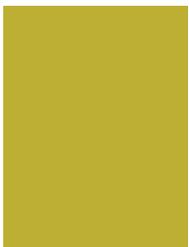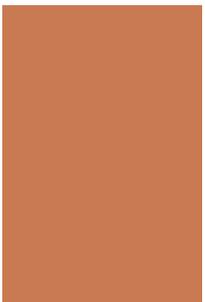
Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

Vilko Petrić,[1] Ivona Tomée,[2] Sanja Ljubičić[1]
[1] Univetrsity of Rijeka, Faculty of Teacher Education, Rijeka, Croatia
vilko.petric@uniri.hr, sanja.ljubicic@uniri.hr
[2] Kinedrgarten Katarina Frankopan, Krk, Croatia
ivona.tomee@student.uniri.hr

The aim of the work was to analyse the representation of movement in alternative curricula of early and preschool education and to compare it with the level of representation of movement in the Croatian curriculum. The research used the method of content analysis and compared the curricula of kindergartens where Montessori, Waldorf, Agazzi programmes were implemented to those applying regular programmes. The Chi-squared test was used to determine the significance of the differences between the researched curricula. A statistically significant difference in the overall representation of movement was found between alternative programmes and the Croatian curriculum, while no statistically significant difference was found when comparing alternative curricula. Movement is significantly more represented in alternative curricula compared to the Croatian curriculum for early and preschool education. For alternative pedagogies, movement is one of the key segments of a child's development, and as such, it is strongly represented in educational work.

Zastopanost gibanja v alternativnih kurikulumih za predšolsko vzgojo: primer Republike Hrvaške

Vilko Petrić,[1] Ivona Tomée,[2] Sanja Ljubičić[1]
[1] Univerza v Reki, Pedagoška fakulteta, Reka, Hrvaška
vilko.petric@uniri.hr, sanja.ljubicic@uniri.hr
[2] Vrtec Katarine Frankopan, Krk, Croatia
ivona.tomee@student.uniri.hr

Namen dela je bil analizirati zastopanost gibanja v alternativnih kurikulumih zgodnje in predšolske vzgoje in jo primerjati s stopnjo zastopanosti gibanja v hrvaškem kurikulumu. V raziskavi smo uporabili metodo vsebinske analize in primerjali kurikulume vrtcev, kjer se izvajajo programi Montessori, Waldorf, Agazzi, s tistimi, ki uporabljajo redne programe. Za ugotavljanje pomembnosti razlik med raziskovanimi učnimi načrti smo uporabili test hi-kvadrat. Med alternativnimi programi in hrvaškim kurikulumom je bila ugotovljena statistično značilna razlika v skupni zastopanosti gibanja, medtem ko pri primerjavi alternativnih kurikulumov ni bilo statistično značilne razlike. Gibanje je bistveno bolj zastopano v alternativnih učnih načrtih v primerjavi s hrvaškim učnim načrtom za zgodnjo in predšolsko vzgojo. Za alternativne pedagogike je gibanje eden ključnih delov otrokovega razvoja in je kot takšno močno zastopano v vzgojnem delu.

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

463

1   Introduction

The subject of this research are the alternative curricula of early and preschool education that are present in the Republic of Croatia and are implemented in certain early education institutions. According to the National Pedagogical Standard (2008), these are alternative educational programs based on the concepts of Montessori, Waldorf and Agazzi pedagogy. Montessori pedagogy is based on the philosophy of the child's natural development, where children discover their environment and themselves through movements and sensory experiences, while the educator's task is to provide an appropriate environment for stimulating physical, cognitive and socio-emotional development (Garmaz & Tomšević, 2018). Waldorf pedagogy is based on the anthroposophical principles of Rudolf Steiner and places emphasis on the freedom and integral development of the child, where the educator recognizes and supports the child's interests with the aim of realizing the child's full potential (Aljabreen, 2020). Agazzi pedagogy emphasizes the importance of the environment in which the child spends time. The environment should be filled with love and warmth, and adapted to the needs and interests of children. It believes that the movement is the children's primary interest (De Beni, Šimović & Gasparini, 2013).

Movement, that is moving, is a muscular activity implying the biotic need of man, which is necessary for him to live (Petrić, 2021). It is a natural and lifelong activity that should be encouraged from birth (Jones & Okely, 2011). Movement is a prerequisite for a better quality of life and is the basis of every child's growth (Petrić, 2022) because it affects the overall development of the child, including cognitive, communication and socioemotional aspects of development (Sollerhed, Olesen, Froberg et al., 2021). Movement activates many mental abilities, connects and establishes new information and experiences in the neural network, and represents an important role and influence in the expression of knowledge and understanding (Vujičić, Peić and Petrić, 2020). In children, movement is emphasized from birth (Vujičić & Petrić, 2021), that is, children receive stimuli from their environment through movement and sensory experience, which creates neural connections in the brain, consequently leading to learning (Hannaford, 2007). Movement is directly related to the development of the brain and plays a major role in the learning process, more specifically, movement scientifically affects the formation of synapses in the child's brain (Jensen, 2005). Therefore, it is extremely important to create conditions in which the child can move naturally (Ali, McLachlan, Mugridge et al., 2021).

Children are more active in the learning process when they move and participate in active play, in contrast to passive sitting and minimal use of their own body when participating in activities (Alharbi & Alzahrani, 2020). The results of numerous studies on children's physical activity show the importance and benefits of movement in early childhood (Sollerhed, Olesen, Froeberg et al., 2021; Lu and Montague, 2016; Senol, 2021; Díaz-Quesada, Gálvez-Calabria, Connor et al., 2022; Wang, 2022; Sollerhead, 2022).

Therefore, the aim of this paper is to determine the level of representation of movement in alternative early and preschool education curricula implemented in specific early education institutions in the Republic of Croatia, and to compare it with the level of representation of movement in the Croatian curriculum for early and preschool education (CCEPE).

2 Methods

2.1 Object, research variables and research protocol

In the first step of the research, using the method of content analysis, internet sources of alternative curricula in institutions for early education in the Republic of Croatia were investigated. Based on the criterion that the curricula of alternative programs, available on the Internet and present in the educational practice of the Republic of Croatia, three alternative (pedagogical) curricula were singled out: Montessori pedagogy, Waldorf pedagogy and Agazzi pedagogy.

What followed was the analysis of the curricula applied in kindergartens where the listed alternative programs were implemented. According to the analysis, the following elements were distinguished according to the criterion of the representation of movement: principles of educational work focused on movement, motor-kinesiological content and spatial-material organization related to movement. The principles of educational work refer to the basic principles on which a certain alternative curriculum is based, and are closely related to the importance of movement. Motor and kinesiology contents include a number of different motor contents that are present in the physical activities of individual alternative curricula. Spatial-material organization takes into consideration the characteristics of spatial

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

465

planning and the diversity of materials in the studied alternative curricula of early and preschool education.

In the third step of the analysis, the mentioned elements were investigated according to their specificities, and it was recorded whether or not there was a representation of a certain variable. These are presented in the Results chapter.

2.2   Statistical data analysis

In data processing, a combination of qualitative and quantitative methods was used, that is, the data were analysed with the SPSS Statistics 21 program. The results were expressed in percentages of total frequencies and presented in the form of tables and graphs. The content analysis method and Chi-squared test were applied. The level of significance of differences in percentages was tested at the $p<0.05$ level.

3   Results

The following presents and explains the research results in tabular and graphical form.

Frequencies of representation of educational principles focused on movement are shown in Table 1. Most variables are not represented in all curricula, except Emphasis on integral development of the child. In the Montessori and Waldorf curriculum, movement is integrated into children's activities, while in Agazza and the standard curriculum, the mentioned variable is not present, which implies a 50 % presence of the mentioned variable in the researched curricula. Movement is the basis for further development only in the Montessori curriculum, hygiene is a prerequisite for healthy physical development of the child in the Agazzi curriculum, while the educator is a role model in promoting the importance of physical movement in Waldorf pedagogy. The level of representation of individual variables in relation to the principles of educational work focused on movement and expressed in percentages of total frequencies. The same level of representation (60 %) of individual variables is observed in the Montessori and Waldorf curriculum, while the percentage of representation of variables in the Agazzi curriculum is 40 %. The lowest level of representation of variables related to the principles of educational work focused on movement is present in CCEPE (20 %).

Table 1: The frequencies of representation of educational principles oriented toward movement

Educational principles oriented toward movement	Montessori	Waldorf	Agazzi	Croatia
Emphasis on children's integral development	1	1	1	1
Movement is the basis for children's further development	1	0	0	0
Movement is integrated in children's activities	1	1	0	0
Hygiene is the prerequisite for healthy physical development of children	0	0	1	0
The educator is a role model in promoting the importance of physical movement	0	1	0	0
Overall representation expressed in %	60.00 %	60.00 %	40.00 %	20.00 %

Table 2: Frequency of representation of motor – kinesiological contents

Motor – kinesiological contents	Montessori	Waldorf	Agazzi	Croatia
Stimulating physical exercising	1	1	1	0
Stimulating physical exercising outdoors	1	1	1	0
Bothmer gymnastics	0	1	0	0
Eurhythmics – aesthetics of movement	0	1	0	0
Organised physical education activity	0	0	0	1
Motor content stimulating the development of gross motor skills	1	1	1	1
Motor content stimulating the	1	1	1	1

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

467

Motor – kinesiological contents	Montessori	Waldorf	Agazzi	Croatia
development of fine motor skills				
Practical life exercises	1	0	1	0
Walking on the line (ellipsis) exercises / balance exercises	1	0	0	0
Exercises for carrying different objects	1	0	1	0
Exercises for opening and closing objects	1	0	1	0
Jump rope	0	1	0	0
Motor content stimulating the development of coordination	1	0	1	0
Creative activities for the stimulation of fine motor skills development	0	1	0	0
Physical exercising with storytelling	0	1	0	0
Overall representation expressed in %	60.00 %	60.00 %	53.33 %	20.00 %

Table 2 shows the results of the representation of variables in the framework of motor and kinesiology content. Motor content for encouraging the development of gross and fine motor skills is represented in all researched curricula, followed by stimulating physical exercise in closed and open spaces in all three alternative curricula. Interestingly, organized physical activity is represented only in CCEPE. The level of representation of individual variables in relation to the motor - kinesiological content of educational work is expressed in percentages of total frequencies. The highest percentage is found in the Montessori and Waldorf curriculum (60 %), a slightly lower percentage of representation of motor-kinesiological content is visible in the Agazzi curriculum (53.33 %), while the CCEPE representation of motor-kinesiological content is only 20 %. When compared to alternative curricula, this is a three times lower value.

Table 3: Frequency of representation of the spatial-material variables in the organisation of movement

Spatial-material organisation linked to movement	Montessori	Waldorf	Agazzi	Croatia
The mirror as a tool for the stimulation of coordination	0	0	1	0
Standardised Montessori material	1	0	0	0
Special space for movement	1	0	1	0
Availability of materials	1	1	1	1
Emphasis on order in the space	1	0	1	0
Materials inviting the child to activity and movement	1	1	1	0
Furniture is adapted in size to children and their strength	1	1	1	1
More pieces of the same material	0	1	1	1
Clear, open space which enables and stimulates movement	1	1	0	0
Unshaped natural materials in their original shape	0	1	0	0
Overall representation expressed in %	70.00 %	60.00 %	70.00 %	30.00 %

Table 3 shows the frequency of representation of variables for the element of spatial-material organization that is related to movement. As in the previous researched elements, there is a very small number of variables that are represented in all curricula. According to the obtained results, only the availability of materials and child-friendly furniture is present in all curricula, while other variables are present differently in individual ones. The Croatian curriculum for early and preschool education is the only one in which every represented variable is also present in one of the alternative curricula; considering the element of spatial-material organization related to movement, certain variables are again differently represented in the researched curricula. The level of representation in certain spatial-material variables

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

469

in the organization of movement is expressed in percentages of total frequencies. The Montessori and Agazzi curriculums have the highest frequency of representation (70 %). As in all previous elements, the percentage of total frequencies is the lowest in the standard curriculum (30 %).
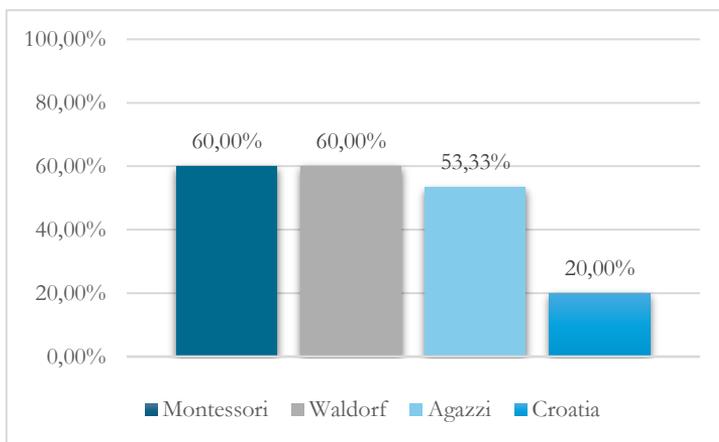
Chart 1: Overall percentage of movement representation

Chart 1 shows the overall average of the representation of movement, more precisely the average of the representation of all researched variables in all isolated elements (principles of educational work focused on movement, motor-kinesiological content and spatial-material organization related to movement). According to the obtained total average, it can be seen that the highest level of movement representation is in the Montessori curriculum (63.33 %), followed by the Waldorf curriculum (60.00 %) and then the Agazzi curriculum (54.44 %). The largest deviation in the obtained overall average is present at CCEPE, where the representation of all variables related to movement is 23.33 %.

Table 4: Differences in the total representation of movement in alternative programmes

chi - square	df	p
0.682	2	0.711

In Table 4, it can be seen that there is no statistically significant difference in the total representation of movement in alternative curricula. It can be said that it is equally represented in the Montessori, Waldorf and Agazzi curriculum.

**Table 5: Differences in the total representation of movement between alternative
programmes and the full-time programme Early and Preschool Education**

chi - square	df	p
20.772	3	0.0001

However, when we compare the total representation of movements in all alternative
curricula and the total representation of movements in CCEPE (Table 5), we can
see that there is a statistically significant difference between them in favour of
alternative curricula. In other words, statistically significantly more movements are
integrated in alternative curricula compared to CCEPE.

4   Discussion

The obtained research results show that all the analyzed curricula, which are related
to the importance of movement, are represented differently in individual curricula.
The Montessori and Waldorf curriculums are particularly noteworthy here, as they
show the highest percentage of representation of educational principles focused on
movement, and in both curricula, emphasis is placed on the integral development of
the child and the integration of movement into children's activities. These results are
consistent with all previous research on the representation of movements in
alternative curricula (Pate et al., 2014; Byun et al., 2013; Rusănescu et al., 2018;
Stowell, 2014; Sobo, 2015; Bhatia et al., 2015) where there is a high level of
representation of movement in educational work. However, what is stated in the
aforementioned research as the reason for the high level of representation of
movement is precisely the educational principles that are aimed at movement. In
Montessori and Waldorf pedagogy, the importance of movement for the child is
emphasized the most, the integral development of the child is encouraged,
movement is set as the basis of child development, and it is integrated into numerous
children's activities. Therefore, most of the educational principles on which
Montessori and Waldorf pedagogy are based are aimed at movement in early
childhood. In order for movement to be represented in educational work, it is crucial
to understand the principles related to the movement the curriculum is based on,
that is, how much importance is attached to movement itself. Therefore, this
represents the basis for including movement in everyday educational work. It is
necessary to first understand why movement is crucial for the optimal growth and
development of a child and, in accordance with this understanding, build principles

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

471

that will be closely related to the importance of movement. When such a foundation is created, then the educational work is further built and shaped in accordance with the established principles. It was from such principles that Maria Montessori and Rudolf Steiner started. In their philosophy they emphasized the importance of children's movement and sensory experience for the realization of a child's full potential. At the same time, the educational principles on which the mentioned alternative curricula are based are set in accordance with children's nature and their way of learning, such as, for example, the integration of movement into educational work. Thus, the Montessori and Waldorf curriculum are based on educational principles that promote movement, but which are also in line with children's natural development.

Furthermore, when observing the results in the area of representation of motor-kinesiology content in the analysed curricula, it is observed that most motor-kinesiology content is represented differently in individual curricula. The majority of motor-kinesiology content is present in only one or two alternative curricula, while only a few isolated motor-kinesiology contents are present in all alternative curricula and all curricula in general. The results indicate the specificity of each individual alternative curriculum, that is, it is noted that each individual approach includes movement in a different, unique way. For example, in the Waldorf curriculum, movement is represented through song and the telling of folk stories in the morning circle, where the activity is completed with body movements and finger play (Stowell, 2014). According to research conducted by Sobo (2015), in some Waldorf institutions, children cut carrots, sew, knead dough, garden, dig, and the like. Through all the mentioned activities, the child is extremely physically active, and this way of integrating movement into the activity is specific exclusively to Waldorf pedagogy, where the child tries to be in contact as much as possible with unformed natural material that is in its original form. Then, in the Montessori curriculum, movement is represented through the encouragement of practical life activities that were first presented by Maria Montessori. It has been investigated that practical life activities have a significant effect on improving the fine motor skills of children in kindergarten (Rule & Stewart, 2002). On the other hand, the Agazzi curriculum is specific in that a mirror is used as a tool for encouraging hand-eye coordination (Gardani, 2012). The mentioned specificities of motor-kinesiological content in alternative curricula represent a valuable source of ideas and suggestions for enriching CCEPE. If certain features from all three alternative curricula were

implemented in CCEPE, a wealth of different ways of implementing movement in the educational process would be obtained. In this way, movement would become the main guide in the organization of educational work, children would be more active in the learning process, the child would be approached as a whole being that learns in an integrated way, and the educator could monitor the needs of children and support their interest more easily. Thus, educational work would be in accordance with the principle that movement is the basis of child development and that it should be encouraged from the earliest age as a prerequisite for healthy growth and development of the child, which is the goal of every early childhood education institution.

Based on the results of the research, an unequal representation of spatial-material variables can be observed in the organization of movement, where the Montessori and Agazzi curricula achieve the highest levels of representation of the mentioned variables. In particular, Montessori pedagogy has always been recognized for its high-quality and stimulating spatial-material organization, and in fact this is one of the key specificities of the Montessori curriculum when it talks about movement. Precisely, the authors Pate et al. (2014), as Byun et al. (2013), point out that the reason why children are more physically active in the Montessori program is due to the stimulating structure of space and materials. The Montessori curriculum advocates spacious and open rooms containing materials that encourage children to move (Pate et al., 2014). The positive impact of using special Montessori materials on the motor skills of early and preschool children is also visible in numerous other studies (Bhatia et al., 2015; Rule & Stewart, 2002; Prendergast, 1969; Stodolsky & Karlson, 1972). The obtained results, as well as the results of the aforementioned research, clearly show the importance of space in early childhood education institutions. The encouraging and dynamic organization of space creates numerous opportunities for children to learn and move. Such a structured space invites the child to be active and participate in the educational process, which is one of the prerequisites for encouraging movement in educational work. With a richly equipped environment, children are given more opportunities to create interactions with the environment, independence in learning is encouraged, their interests are respected, and the basis for all this is movement, only possible in a rich stimulating environment.

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

473

According to the research results, there is a statistically significant difference in the total representation of movement between alternative curricula and CCEPE, while there is no statistically significant difference in the total representation of movement among the alternative curricula themselves. The above data indicate insufficient representation of movement in the standard curriculum compared to the analysed alternative curricula. That movement is underrepresented in CCEPE is also shown by the research conducted by Vujičić, Petrić and Novak (2019), where the differences between the stimulating spatial environment that promotes movement and the currently standard rooms in early education institutions were shown (Vujičić & Petrić, 2021). According to the research, it is evident that children are not encouraged to move in standard decorated rooms, more precisely, there is a large amount of furniture that takes up most of the space, desks force children to sit and do sedentary activities, the corridor is difficult to walk through, and the open area of the kindergarten is poor in equipment. In addition to the arrangement of the space, the research emphasizes that physical activities are mostly of an organized type, carried out exclusively according to the instructions and under the guidance of preschool teachers. On the other hand, author Hannaford (2007) cites Rudolf Steiner and Maria Montessori as prominent pedagogical experts who emphasized the extreme importance of movement for the child's development and learning process.

It is assumed that the obtained differences in the level of movement representation between alternative curricula and CCEPE come because in alternative pedagogies the importance of movement is still nurtured and encouraged. Movement is considered the main driver of a child's complete development (Petrić, 2021) and represents one of the main backbones of educational work in alternative pedagogies. The principles of educational work are based on such values, the motoric-kinesiological content is designed according to this, and the spatial-material environment is structured accordingly. However, CCEPE does not yet fully recognize the value of movement and the effect it has on a child's learning and development. It is believed that this is the reason for a low level of representation of movement according to the principles of educational work focused on movement, as well as a smaller number of motor-kinesiological content is present in CCEPE, one of which is precisely an organized activity guided by preschool teachers where the child is passive. The activities are not in accordance with the child's nature and the child's current interests and needs are not respected.

5   Conclusion

In the analyzed alternative curricula, movement is equally represented in all studied elements and statistically significantly more compared to the CCEPE of early and preschool education. The article shows how different alternative curricula experience movement and how they "live" in early childhood education institutions. New ideas and possibilities of integrating movement into educational work would be opened up by introducing certain specificities of alternative curricula in CCEPE.

One of the shortcomings of the research is that the results rely exclusively on the theoretical analysis of the curricula content, so for future research it is suggested to determine how much movement is truly represented in practice. Alternative conceptions in the system of early and preschool education in the Republic of Croatia are often marginalized, and their importance is not sufficiently recognized. In their educational philosophy, they place movement as a priority, so it is not surprising that movement is significantly represented in all domains of their educational work. First of all, it is necessary to form one's own philosophy of education in which one of the foundations will be the importance of movement. After that, by implementing individual specificities from each alternative curriculum, an environment in which the child will have numerous opportunities for movement can be ensured.

The research results provide arguments for changes in the education system, while critical thinking about practice and recognition of the diversity of pedagogical approaches can stimulate innovations and improvements that will have a positive impact on future generations.

References

Alharbi, M. O., & Alzahrani, M. M. (2020). The importance of learning through play in early childhood education: Reflection on the Bold Beginnings Report. International Journal of the Whole Child, 5(2), 9-17.
Ali, A., McLachlan, C., Mugridge, O., McLaughlin, T., Conlon, C., & Clarke, L. (2021). *The effect of a 10-week physical activity programme on fundamental movement skills in 3–4-year-old children within early childhood education centres. Children, 8*(6), 440.
Aljabreen, H. (2020). *Montessori, Waldorf, and Reggio Emilia: A Comparative Analysis of Alternative Models of Early Childhood Education.* IJEC 52, 337–353 (2020). https://doi.org/10.1007/s13158-020-00277-1

V. Petrić, I. Tomée, S. Ljubičić: Representation of Movement in Alternative Curricula of Early and Preschool Education: The Case of the Republic of Croatia

475

Bhatia, P., Davis, A., & Shamas-Brandt, E. (2015). *Educational gymnastics: The effectiveness of Montessori practical life activities in developing fine motor skills in kindergartners.* Early Education and Development, 26(4), 594-607.

Byun, W., Blair, S. N., & Pate, R. R. (2013). *Objectively measured sedentary behavior in preschool children: Comparison between Montessori and traditional preschools.* International Journal of Behavioral Nutrition and Physical Activity, 10(1), 1-7.

De Beni, M., Šimović, V. & Gasparini, A. (ur.) (2013) *Pedagogija zajedništva i Agazzi metoda.* Zagreb, Učiteljski fakultet, Zagreb.

Díaz-Quesada, G., Gálvez-Calabria, M. D. L. Á., Connor, J. D., & Torres-Luque, G. (2022). *When Are Children Most Physically Active? An Analysis of Preschool Age   Children's Physical Activity Levels.* Children, 9(7), 1015.

Državni pedagoški standard (2008). Narodne novine. Pribavljeno 3.2.2022., s https://narodne-novine.nn.hr/clanci/sluzbeni/full/2008_06_63_2128.html

Gardani, P. (2012). *Odgojni prijedlog Rose Agazzi.* U: M. De Beni, V. Šimović i A. L. Gasparini (ur.), Pedagogija zajedništva i Agazzi metoda. str. 143.-150., Zagreb: Učiteljski fakultet u Zagrebu.

Garmaz, J. & Tomašević, F. (2018). *Odgajanje opažanjem: neke specifičnosti odnoga prema Montessori pedagogiji.* Služba Božja, 58 (4), 443-464.

Hannaford, C. (2007). *Pametni pokreti: zašto ne učimo samo glavom : gimnastika za mozak.* Buševec: Ostvarenje.

Jensen, E. (2005). Poučavanje s mozgom na umu. Zagreb: Educa.

Lu, C., & Montague, B. (2016). Move to learn, learn to move: Prioritizing physical activity in early childhood education programming. *Early Childhood Education Journal*, *44*, 409-417.

Nacionalni kurikulum za Rani i predškolski odgoj i obrazovanje (2014). Republika Hrvatska. Zagreb: Ministarstvo znanosti, obrazovanja i sporta

Pate, R. R., O'Neill, J. R., Byun, W., McIver, K. L., Dowda, M., & Brown, W. H. (2014). *Physical activity in preschool children: comparison between Montessori and traditional preschools.* Journal of School Health, 84(11), 716-721.

Petrić, V. (2021). *Osnove kineziološke edukacije.* Rijeka: Sveučilište u Rijeci, Učiteljski fakultet.

Petrić, V. (2022). *Kineziološke aktivnosti djece rane i predškolske dobi – postignuća kineziološke metodike.* Rijeka: Sveučilište u Rijeci. Učiteljski fakultet.

Prendergast, R. (1969). Pre-reading skills developed in Montessori and conventional nursery schools. *The Elementary School Journal*, *70*(3), 135-141.

Rule, A. C., & Stewart, R. A. (2002). Effects of practical life materials on kindergartners' fine motor skills. *Early Childhood Education Journal*, *30*, 9-13.

Senol, F. B. (2021). Physical Activity and Preschool Children: Preschool Teachers' Perceptions. *Southeast Asia Early Childhood*, *10*(2), 132-146.

Sobo, E. J. (2015). Salutogenic education? Movement and whole child health in a Waldorf (Steiner) school. Medical Anthropology Quarterly, 29(2), 137-156.

Sollerhed, A. C., Olesen, L. G., Froberg, K., Soini, A., Sääkslahti, A., Kristjánsdóttir, G., ... & Ekberg, J. E. (2021). Movement and physical activity in early childhood education and care policies of five nordic countries. *International journal of environmental research and public health*, *18*(24), 13226.

Sollerhed, A. C. (2022). *Perceived insufficient pedagogical content knowledge in teaching movement and physical activity. Experiences from an action-oriented study among educators in early childhood education and care.* Frontiers in Sports and Active Living, 4.

Stodolsky, S. S., & Karlson, A. L. (1972). Differential outcomes of a Montessori curriculum. *The Elementary School Journal*, *72*(8), 419-433.

Stowell, D. (2014). *Waldorf kindergarten and Reggio-inspired kindergarten: Documenting value and effectiveness of two arts-based approaches* (Doctoral dissertation, University of Denver).

Vujičić, L., Petrić, V., & Novak, D. (2019). *Correlation between the Stimulating Spatial Environment and Children's Movement in Institutions for Early Education.* U: Antala, B., Demirhan, G., Carraro, A., Oktar, C., Oz, H. & Kaplánová, A. (ur.) Physical Education in Early Childhood

Education and Care Researches – Best Practices – Situation. Bratislava, Slovakia, Slovak Scientific Society for Physical Education and Sport and FIEP, str. 165-174.

Vujičić, L., Peić, M., & Petrić, V. (2020). Representation of movement-based integrated learning in different physical environments of an early education institution. *Journal of Elementary Education*, *13*(4), 453-474.

Vujičić, L. & Petrić, V. (2021). *Integrirano učenje uz pokret u ustanovama ranog odgoja*. Sveučilište u Rijeci, Učiteljski fakultet.

Wang, C. (2022). *The role of physical activity promoting thinking skills and emotional behavior of preschool children*. Psicologia: Reflexão e Crítica, 35.

Promoting Fundamental Motor Skills in the Transition from Kindergarten to School

Martina Jaunik,[1] Marjeta Kovač,[2]
Klemen Bedenik,[3] Miha Marinšek[1]

[1] University of Maribor, Faculty of Education, Maribor, Slovenia
martina.jaunik@guest.um.si, miha.marinsek@um.si
[2] University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia
marjeta.kovac@fsp.uni-lj.si
[3] Association of Maribor Sports Clubs Branik, Maribor, Slovenia
klemen.bedenik@zmsd-branik.si

The aim of the study was to compare the effectiveness of interventions promoting fundamental motor skills (FMS) in preschoolers and first-year schoolchildren in north-east Slovenia and to investigate possible gender differences. The study involved 143 children with typical development aged four to seven years, divided into an experimental group and a control group. The experimental group took part in a 13-week intervention programme, while the control group followed the standard curriculum for physical education in Slovenian public kindergartens and schools. *The test of gross motor development 3* was used to assess the improvement of FMS. The results showed that after the intervention, the improvement in locomotor and ball skills were in preschool children higher than in first-year schoolchildren. No gender differences were found in FMS improvement. These results have important implications for the development of FMS in young children and for the design of intervention programmes promoting these skills.

University of Maribor Press

Spodbujanje temeljnih gibalnih spretnosti na prehodu iz vrtca v šolo

Martina Jaunik,[1] Marjeta Kovač,[2]
Klemen Bedenik,[3] Miha Marinšek[1]
[1] Univerza v Ljubljani, Pedagoška fakulteta, Ljubljana, Slovenija
martina.jaunik@guest.um.si, miha.marinsek@um.si
[2] Univerza v Ljubljani, Fakulteta za šport, Ljubljana, Slovenija
marjeta.kovac@fsp.uni-lj.si
[3] Zveza mariborskih športnih društev Branik
klemen.bedenik@zmsd-branik.si

Cilj raziskave je bil primerjati učinkovitost vadbenih programov za usvajanje temeljnih gibalnih spretnosti (TGS) med predšolskimi otroki in otroki 1. razreda v severovzhodni Sloveniji in raziskati možne razlike med spoloma. V raziskavi je sodelovalo 143 otrok, starih od 4 do 7 let, ki so bili razporejeni v eksperimentalno oziroma kontrolno skupino. Eksperimentalna skupina je sodelovala v 13-tedenskem vadbenem programu, kontrolna skupina pa je sledila kurikulumu oz. učnemu načrtu za gibanje oz. šport za javne vrtce in šole. *Naloge za ocenjevanje grobe motorike 3* so bile uporabljene za oceno TGS. Rezultati so pokazali, da so predšolski otroci bolj napredovali v spretnostih obvladovanja telesa in spretnostih z žogo kot otroci 1. razreda. Med spoloma ni bilo razlik. Rezultati so pomembni za oblikovanje vadbenih programov, katerih namen je usvajanje TGS.

1   Introduction

Early childhood is a critical period for the development of fundamental motor skills (FMS), which include basic movement patterns such as running, jumping, throwing, and catching (Holfelder & Schott, 2014). The acquisition of FMS during the preschool years lays the foundation for proficient movement and physical activity throughout life (Iivonen, Sääkslahti, & Nissinen, 2011). Therefore, promoting the development of FMS in young children is of paramount importance for their overall health, well-being, and academic success (Goodway, Crowe, & Ward, 2003). Children do not develop FMS naturally through maturational processes; these skills need to be learnt, practised, and reinforced (Logan et al., 2012).

Mastering FMS in early childhood is associated with numerous benefits, which are not limited only to physical competence, but to an overall physical literacy of children. FMS give children the opportunity to explore their environment and learn about the world around them, which improves their cognitive functioning, social integration, and emotional regulation (Goodway, Ozmun, & Gallahue, 2019). In addition, children with advanced FMS proficiency are more likely to engage in regular physical activity, reducing the risk of obesity and related health complications (Iivonen et al., 2011). Given the global concern about physical inactivity and childhood obesity, promoting FMS development in early childhood has gained increasing attention from educators, health professionals, and policy makers (Higgins et al., 2019). Consequently, interventions aimed at improving FMS in early childhood have the potential to bring significant public health benefits by promoting an active lifestyle from an early age (Iivonen et al., 2011).

At school, children with a well-developed FMS are better able to participate in physical education and leisure activities, facilitating better school readiness and academic performance (Kalaja et al., 2012). School readiness is a multi-faceted concept that encompasses a range of cognitive, emotional, social, and physical skills required for a successful transition into formal education (Blair & Raver, 2015). Among these skills, FMS have emerged as a critical component of school readiness, as they form the foundation for physical activity and academic achievement (Iivonen, Sääkslahti, & Nissinen, 2011).

Despite the importance of FMS, many children do not develop these skills sufficiently. This may be due to a lack of opportunities for physical activity, limited access to equipment, or a lack of instruction and guidance (Logan et al., 2012; Wick et al., 2017). According to a comprehensive systematic review of 65 separate studies on children's FMS levels, children have "below average" to "average" FMS levels (Zhang et al., 2024). Similar situation was recently found in Slovenian children (Kastelic, Kovač, & Marinšek 2022; Pavlič, Kovač, & Marinšek 2022; Marinšek, Štopfer, & Kovač 2023). Therefore, interventions are needed to promote the development of FMS in young children.

The importance of FMS in the early years has led to the introduction of intervention programmes designed to promote these skills in kindergarten. Such interventions have shown promising effects on overall FMS proficiency, as well as on specific components such as object control and locomotor skills (Lloyd et al., 2014). These interventions are particularly important for typically developing preschool children aged 2 to 6 years, as this developmental stage represents a critical window of opportunity for the acquisition and refinement of motor skills (Stodden et al., 2008).

A recent study found that just two 30-minute lessons per week with implemented games can significantly improve FMS proficiency of 8- to 10-year-old children (Costello & Warne, 2020), and the results were consistent with previous research on motor skill interventions. FMS proficiency was improved in a way that reduced the difference between FMS skills in boys and girls. Another study examining the effectiveness of a 30-week FMS programme in typically developing 3- to 8-year-old children found that locomotor and object control scores increased as children got older (Bardid et al., 2017). In addition, girls made significantly more progress in locomotor skills than boys and significantly less progress in object control skills than boys.

Despite the potential benefits of FMS interventions, there is a need for a comprehensive understanding of their effectiveness, optimal implementation strategies, and long-term effects. This is particularly important given the variability of intervention approaches, duration, and qualifications of those delivering the programmes (Robinson & Goodway, 2009).

It is the opinion of authors that there is a gap in the literature on the effectiveness of FMS interventions for typically developing preschoolers and primary school children. To fill this gap, the present study compared the effectiveness of FMS interventions in preschool children and children in the first-year of primary school in north-east Slovenia. A second aim was to investigate possible gender differences in FMS and the improvement as a result of intervention. Based on the previous intervention literature (Bardid et al., 2017; Logan et al., 2012), it was hypothesised that primary school children would improve significantly more than preschool children in locomotor skills and object control skills. It was also assumed that girls would improve significantly more in the locomotor skills and less in object control skills than boys.

The education system in Slovenia is currently being reformed (2022-2026). Through these efforts, the debate on school readiness and the criteria that allow children to enter formal education is evolving. To adequately include aspects of motor development in the educational reform, it is necessary to obtain information on acquisition of FMS during the transition of children from kindergarten to school.

2 Materials and methods

2.1 Participants

A sample of children with typical development was used in the study, including preschoolers and children in the first-year of primary schools in north-east Slovenia. A total of 143 children aged four to seven years (M = 5.72; SD = 1.05; 46.9% girls) participated in the study, which was divided into an experimental group (n = 72) and a control group (n = 71). The experimental group was further divided into two subgroups: a kindergarten group (EG-K) consisting of 39 children (M = 5.23; SD = 0.74) and a school group (EG-S) consisting of 33 children (M = 6.86; SD = 0.36). Both EGs took part in a 13-week intervention programme and completed pre-, post- and retention tests. During the same period, the control group from kindergarten (CG-K) participated in a programme based on a standard kindergarten curriculum (Bahovec et al., 1999) used in Slovenian public kindergartens. A control group from school (CG-S) participated in a programme based on a standard curriculum for primary school physical education (Kovač et al., 2011) used in Slovenian public

schools. The CG-K comprised 37 children (M = 5.20; SD = 0.98) and the CG-S 34 children (M = 6.81; SD = 0.28).

The study was conducted in accordance with the principles of the Declaration of Helsinki and received ethical approval from the Ethics Committee of the University of Maribor (protocol code 038-21-111/2021/4/FFUM). Consent for participation in the study was acquired from the parents of children as well as from kindergarten- and school-teachers. Study was partly funded by a grant number RR-23-012 from the Sports Foundation of Slovenia.

2.2   Design and intervention programmes

In the study, a pre-test, a post-test, and a retention test were conducted to assess the effects of the intervention. The initial FMS assessment was followed by a further assessment one week after the intervention (post-test) and five weeks after the intervention (retention test). Participants completed a 13-week programme consisting of 13 sessions, each lasting approximately 40 minutes. Each exercise session took place once a week either in the kindergarten or in the school gym for each group individually. In contrast, the control group took part in physical education lessons, typical for Slovenian public kindergartens and schools.

The intervention was implemented in collaboration between university researchers, students, and teachers to integrate key components into the physical education curriculum. It did not include a written curriculum, but rather it was focusing on encouraging implementers to adapt teaching practises and the classroom environment according to their teaching style, classroom dynamics, and the needs of the children.

The intervention comprised structured practise sessions with warm-up (10 minutes), movement skills instruction (20–25 minutes), and closing activity (5 minutes); specific learning objectives; planned skill progression; and feedback, guidance, and correction to support children's improvement in FMS. The aim was to improve the performance of the planned FMS during each practise session. The number of FMS skills covered in each session was at the discretion of the implementer.

Daily fidelity tests were carried out to measure the feasibility of the intervention. Fidelity was assessed by calculating the percentage of intervention sessions that met all explicit criteria, thus ensuring the consistency and quality of the implementation process.

2.3 Procedures and measures

The Test of Gross Motor Development – Third Edition (TGMD-3), a valid and reliable process-based assessment tool for children aged 3-10 years, was used to assess FMS (Marinšek et al., 2023; Ulrich, 2019). The TGMD-3 measures the execution of movements and comprises six locomotor and seven ball-related skills; every child had two attempts to execute individual skills, which were first verbally described and demonstrated. Executed attempts were then scored against a checklist of three to five performance criteria, which were scored as either correct (1 point) or not performed (0 points). The raw scores were calculated by adding up the correctly performed criteria with the maximum possible score being 46 points for locomotor skills and 54 points for the ball skills (100 points in total). A higher score means a higher level of FMS acquired.

Six locomotor skills and seven ball skills were recorded using video footage, which were then assessed by three trained assessors who had completed a comprehensive training programme prior to the study to ensure competency in the TGMD-3 assessment protocol. The assessors were trained for a fortnight and were required to achieve greater than 80% agreement with the results of the reference assessor to demonstrate their competence.

The TGMD-3 showed a high degree of internal consistency, with a Cronbach's alpha of .90 for all tests in the present study. Subtest scores ranged from .93 for locomotor to .89 for ball skills. According to Fayers and Machin (2013), the tests showed acceptable internal consistency with a Cronbach's alpha value of .70 or more.

2.4 Statistical analyses

Two separate 4 × 3 (group x test) ANCOVAs were performed, with repeated measures on the last factor using the raw scores of the locomotor and ball skills subscales, respectively. The aim was to evaluate the effects of the FMS interventions

on the development of the children's locomotor and ball skills. The partial eta-square (ηp^2) was used as an indicator to assess the effect size, with values of 0.01, 0.06, and ≥ 0.14 indicating small, medium, and large effects respectively (Cohen, 1988). The results of the pre-test and age served as covariates in this analysis. Post-hoc comparisons with Bonferroni corrections were performed after a significant main effect was found. Cohen's d was used to assess the effect size (Cohen, 1992). The values corresponded to the following: 0–0.1 = trivial, 0.2–0.4 = small, 0.5–0.7 = medium, and ≥ 0.8 = large.

Normality was assessed separately for kindergarten and school children on the basis of skewness and kurtosis. With the exception of the locomotor score on the pre-test for the school children, the results showed that all values for skewness and kurtosis were below 2.0, which indicates a normal distribution of the data. All assumptions regarding homogeneity (assessed by the Levene test > 0.074) and sphericity were met, with the exception of the sphericity of the motor skills *jump*, *ball strike*, and *underarm throw*, for which the Greenhouse-Geiser correction was applied. All statistical analyses were performed with JASP version 0.17.2 (JASP Team, 2023).

3   Results

The fidelity check showed that all exercise sessions met all the explicit criteria set before the intervention programmes. This ensured the consistency and quality of the moderation process.

3.1   Locomotor skills

Preschool and school children differed statistically significantly in the results of the pre-test. School children (36.3 points or 79% of the maximum score) scored on average 20 percentage points (pp) better in locomotor skills than preschool children (27.2 points or 59% of the maximum score) (Figure 1).

The EG-K showed an improvement in all locomotor skills, from 27.9 to 34.4 points, which corresponds to an improvement of 14 pp. However, all other groups showed only a minimal improvement of 7 pp (EG-S), 4 pp (CG-K) and 3 pp (CG-S). In the post-test, the difference between EG-K (34.9 points or 76% of the maximum score)

and CG-S (37.8 points or 82% of the maximum score) was only 6 pp and in the retention test 9 pp (75% vs. 84%).
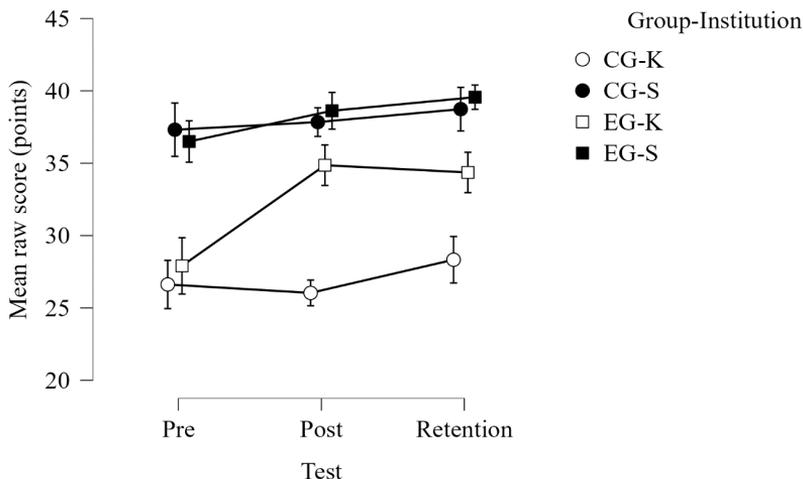

Figure 1: Locomotor results (dots) before, after and during retention as well as 95% confidence intervals (vertical lines) for the kindergarten/school experimental groups (EG-K and EG-S) and the control groups (CG-K and CG-S).
Source: own

A 4×3 (group x test) ANCOVA with repeated measures on the last factor and pre-test scores and age as covariates revealed a significant group-by-test interaction for locomotor skills $F(6, 210) = 9.98$, $p < .001$, $\eta p^2 = .28$, with a strong intervention effect size. Both covariates, pre-test score and age ($p < .001$), were statistically significant. Post-hoc t-tests revealed significant improvements from the pre-test to the post-test ($p < .001$, $d = 2.42$) and from the pre-test to the retention test ($p < .001$, $d = 2.18$) for the EG-K. No significant improvements were observed for the other groups EG-S, CG-K, and CG-S ($p > .05$) (Figure 1).

A separate ANCOVA with repeated measures for school and preschool children revealed a non-significant group-by-test interaction for locomotor skills in school children ($p = .379$) and a significant group-by-test interaction for locomotor skills in preschool children ($p < .001$).

The improvement with the largest effect size (Cohen's d from pre-test to post-test and from pre-test to retention test) in the individual locomotor scores in preschool children was observed in motor skills *run* (d = 1.349 and d = 1.058), *skip* (d = 0.987 and d = 1.161), *slide* (d = 0.606 and d = 1.277), and *hop* (d = 1.063 and d = 0.918). A significant improvement from the pre-test to the post-test, but without retention, was observed for the motor skill *horizontal jump* (d = 0.952) and a non-significant improvement for motor skill *gallop*. In school children, an improvement from the pre-test to the retention test was observed for motor skill *run* (d = 1.532), *gallop* (d = 1.334), and *hop* (d = 1.240). However, no significant improvement was observed for motor skills *skip, horizontal jump* and *slide*.

Table 1: Descriptive statistics for locomotor skill scores across gender, tests, and institutions

Test	Gender	Institution	Locomotor skills		
			Mean	SD	SE
Pre	Boys	Kindergarten	26.107	9.697	1.832
		School	35.059	5.900	1.431
	Girls	Kindergarten	29.000	11.499	2.710
		School	38.722	2.653	0.625
Post	Boys	Kindergarten	29.000	8.932	1.688
		School	37.765	2.751	0.667
	Girls	Kindergarten	32.222	10.519	2.479
		School	38.611	2.831	0.667
Retention	Boys	Kindergarten	30.107	8.821	1.667
		School	38.471	2.154	0.522
	Girls	Kindergarten	32.944	8.888	2.095
		School	39.722	2.866	0.675

Source: own

A separate ANCOVA with repeated measures for preschool and school children revealed a non-significant interaction between group, test, and gender for the locomotor skills of preschool children (p = .230) and school children (p = .573), suggesting that there were no differences in improvement between girls and boys in the control or experimental group (Table 1).

3.2   Ball skills

Preschool and school children differed statistically significantly in the results of the pre-test. School children (35.0 points or 65% of the maximum score) performed on average 20 pp better in ball skills than preschool children (24.2 points or 45% of the maximum score) (Figure 2).

The EG-K showed improvements in all ball motor skills, from 25.5 to 35.0 points, an improvement of 18 pp. However, all other groups showed only a minimal improvement of 5 pp (EG-S), 4 pp (CG-K) and 3 pp (CG-S). In the post-test, the difference between EG-K (32.3 points or 60% of the maximum score) and CG-S (36.6 points or 68% of the maximum score) was 8% points and in the retention test none (65% vs. 65%) (Figure 2).

A 4×3 (group x test) ANCOVA with repeated measures on the last factor and pre-test scores and age as covariates revealed a significant group-by-test interaction for ball skills $F(6, 210) = 7.22$, $p < .001$, $\eta p^2 = .21$, with a strong intervention effect size. Both covariates, pre-test score and age ($p < .001$), were statistically significant. Post-hoc t-tests revealed significant improvements from the pre-test to the post-test ($p < .001$, $d = 5.74$) and from the pre-test to the retention test ($p < .001$, $d = 7.28$) for the EG-K. Non-significant improvements were found for the other groups EG-S, CG-K, and CG-S ($p > .05$) (Figure 2).
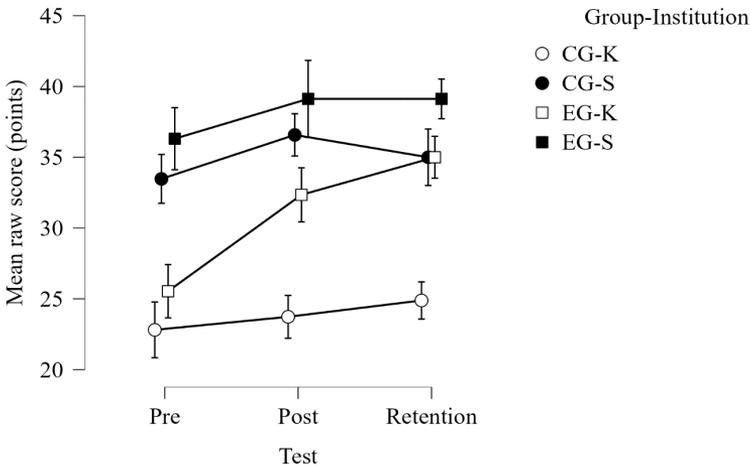
Figure 2: Pre-, post- and retention values of ball skills (dots) and 95% confidence intervals (vertical lines) for the kindergarten/school experimental groups (EG-K and EG-S) and the control groups (CG-K and CG-S).
Source: own

A separate ANCOVA with repeated measures for school and preschool children revealed a non-significant group-by-test interaction for ball skills in school children ($p = .435$) and significant group-by-test interaction for ball skills in preschool children ($p < .001$).

In preschool children, significant improvement was found from pre-test to post-test for *ball strike* (d = 0.865) and from pre-test to retention for *stationary dribble* (d = 1.378) and *overhand throw* (d = 1.358). In addition, a significant improvement with a large effect size was found from the pre-test to the post-test and from the pre-test to the retention for the *forehand strike* (d = 3.431 and d = 5.055) and the *underhand throw* (d = 2.373 and d = 1.952). A non-significant improvement was found for *catch* and *kick*. In the school children, a significant improvement in individual ball skills from the pre-test to the post-test and from the pre-test to retention was found in *stationary dribble* (d = 1.429 and d = 1.336).

Table 2: Descriptive statistics for ball skills scores across gender, tests, and institutions

Test	Gender	Institution	Ball skills		
			Mean	SD	SE
Pre	Boys	Kindergarten	27.966	8.113	1.507
		School	38.529	7.046	1.709
	Girls	Kindergarten	19.391	6.966	1.452
		School	31.222	6.264	1.477
Post	Boys	Kindergarten	30.759	8.078	1.500
		School	41.647	5.291	1.283
	Girls	Kindergarten	24.609	8.489	1.770
		School	34.056	7.033	1.658
Retention	Boys	Kindergarten	32.690	7.663	1.423
		School	39.941	5.141	1.247
	Girls	Kindergarten	26.478	9.760	2.035
		School	34.000	6.869	1.619

Source: own

A separate ANCOVA with repeated measures for preschool and school children revealed a non-significant interaction between group, test, and gender for the ball skills of preschool children (p = .738) and school children (p = .754), suggesting that there were no differences in improvement between girls and boys in the control or experimental group (Table 2).

4 Discussion

The study emphasises the importance of early intervention and the potential for significant improvements in the early stages of FMS development. The results showed that the FMS interventions had a significant effect on the development of

locomotor and ball skills in preschool children, and less significant in school children. This suggests that the FMS interventions in the study were more effective in preschool children (4- to 5-years-old) than in school children (6- to 7-years-old). This is consistent with some of the early studies on teaching strategies, suggesting that instruction is useful in motor learning, especially in the first attempts, whereas the effects on subsequent learning attempts after instruction are rather small (Singer, 1977). In most FMS, children aged 4 to 5 years are in the initial and/or elementary stage and are therefore early trial learners. This is reflected in their mean pre-test score, which was 59% of the maximum score. In contrast, the school children in present study achieved a mean score of 79% of the maximum score in the pre-test. It is plausible that the school children did not improve their motor performance after the intervention due to the high pre-test score that caused only negligible improvement.

The specific analysis of individual locomotor and ball skills revealed noticeable improvements in various skills such as *run, hop, slide, forehand strike, underhand throw* and *stationary dribble*, especially in preschool children. These improvements emphasise the effectiveness of FMS interventions in the targeted promotion of specific movement skills that are essential for the motor development of young children.

It has been stated that the development of FMS in preschool children plays an important role in preparing them for the academic and physical demands of formal schooling (Aydoner & Bumin, 2023). Therefore, it is important that strong motor skills are developed in preschool period, as this will crucially contribute to holistic development and school readiness in children. Namely, motor skills are directly related to the ability of children to participate in classroom activities, play sports, and complete tasks such as writing, cutting, and drawing. Furthermore, fine motor skills involving the coordination of smaller muscle groups, will subsequently develop on the foundation of gross motor development. Additionally, the refinement of manual dexterity and precision in fine motor tasks is closely linked to the underlying strength, balance and coordination built through gross motor experiences (Goodway et al., 2019). Thus, children entering school with well-developed motor skills, will better cope with the demands of the classroom, which will lead to better academic performance and overall school readiness (Jones et al., 2021). It can be concluded

that targeted interventions and instruction to improve preschool children's motor skills could have a positive long-term impact on their academic success.

Due to the stated overall positive effects, the development of FMS should be emphasised in the kindergarten curriculum. Because it promotes school readiness, special attention should be given to monitoring FMS in preschool children. An objective measure to assess the quality of FMS should be introduced in public kindergartens so that practitioners and researchers can monitor the development of children's motor skills for intervention, school readiness and other purposes.

The study provided valuable insights into FMS interventions for young children. However, some limitations should be considered. First, the study included 143 children aged four to seven years, which is not a sufficient number to draw general conclusions. Second, longer interventions or more intensive programmes may be needed to observe more substantial improvements or long-term effectiveness of the interventions. Third, although the TGMD-3 is a valid and reliable instrument, it focuses on the qualitative assessment of motor skills. The study could benefit from the inclusion of additional quantitative measures to provide a more comprehensive assessment of skill acquisition.

Overall, the results of the study emphasise the different response of kindergarten and school children to FMS interventions and highlight the potential for tailored strategies to promote motor development in each age group. This emphasises the importance of considering age-specific factors when developing and implementing interventions to improve FMS in children.

As research continues to highlight the profound impact of FMS on early childhood development, it is critical for teachers and policy makers to prioritise the integration of these skills into children's curricula and daily routines. This can include structured activities such as obstacle courses, balancing games, and ball games, as well as free play opportunities that allow children to explore different movements and physical challenges. In this way, young children will build a strong foundation for their physical, cognitive, and social well-being.

5   Conclusions

Present study emphasises the importance of early intervention and the potential for significant improvements in FMS in the early stages of development. The results suggest that targeted interventions can improve children's FMS proficiency and contribute to their overall development. Key findings of the study include:

- Both the preschool children and the school children who took part in the intervention programme showed significant improvements in their individual locomotor skills and ball skills. The preschool children showed greater improvements than the school children.
- No significant differences in improvement were found between girls and boys, suggesting that interventions do not have to be tailored differently for each gender.
- The study demonstrated the effectiveness of the FMS interventions in targeting specific movement skills, making them an important tool for the motor development of young children.

In summary, the study highlights the need for early intervention and targeted FMS programmes in preschools and primary schools to promote children's motor development and improve their school readiness. Mastery of FMS plays a central role in school readiness as it forms the basis for a child's physical, social, and cognitive development. The importance of FMS for school readiness becomes even more apparent in the context of educational reforms aimed at improving kindergarten and primary school curricula. By incorporating FMS into the kindergarten curriculum and providing appropriate interventions, educators can promote a more comprehensive and holistic approach to child development that ultimately leads to improved school readiness and academic success. As efforts to reform the school system continue, it is critical to prioritise the integration of FMS to ensure that all children have the necessary skills and abilities to succeed in their educational environment.

Acknowledgments

References

Aydoner, S., & Bumin, G. (2023). The factors associated with school readiness: Sensory processing, motor, and visual perceptual skills, and executive functions in kindergarten children. *Applied Neuropsychology: Child.* 1–9. https://doi.org/10.1080/21622965.2023.2275677

Bahovec, E. D., Bregar, K. G., Čas, M., Domicelj, M., Saje Hribar, N., Japelj, B., Jontes, B., Kastelic, L., Kranjc, S., Marjanovič Umek, L., Požar Matijašič, N., Vonta, T., & Pezdir Vovk, A. (1999). *Kurikulum za vrtce [Curriculum for kindergartens].* Ministrstvo za šolstvo in šport.

Bardid, F., Lenoir, M., Huyben, F., De Martelaer, K., Seghers, J., Goodway, J. D., & Deconinck, F. J. (2017). The effectiveness of a community-based fundamental motor skill intervention in children aged 3–8 years: Results of the "Multimove for Kids" project. *Journal of Science and Medicine in Sport*, *20*(2), 184-189.

Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual Review of Psychology*, 66, 711–731. https://doi.org/10.1146/annurev-psych-010814-015221

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). New York: Lawrence Erlbaum.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159.

Costello, K., & Warne, J. (2020). A four-week fundamental motor skill intervention improves motor skills in eight to 10-year-old Irish primary school children. *Cogent Social Sciences*, *6*(1), 1724065. https://doi.org/10.1080/23311886.2020.1724065

Fayers, P. M., & Machin, D. (2013). *Quality of life: The assessment, analysis and reporting of patient-reported outcomes.* Chichester, England: Wiley.

Goodway, J. D., Crowe, H., & Ward, P. (2003). Effects of motor skill instruction on fundamental motor skill development. *Adapted Physical Activity Quarterly*, 20(3), 298–314. https://doi.org/10.1123/apaq.20.3.298

Goodway, J. D., Ozmun, J. C., & Gallahue, D. L. (2019). *Understanding motor development: infants, children, adolescents, adults (8th ed.).* Jones & Bartlett Learning.

Higgins, J. P. T., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. A. (2019). *Cochrane handbook for systematic reviews of interventions (2nd ed.).* John Wiley & Sons.

Holfelder, B., & Schott, N. (2014). Relationship of fundamental movement skills and physical activity in children and adolescents: A systematic review. *Psychology of Sport and Exercise*, 15(4), 382–391. https://doi.org/10.1016/j.psychsport.2014.03.005

Iivonen, S., Sääkslahti, A., & Nissinen, K. (2011). The development of fundamental motor skills of four- to five-year-old preschool children and the effects of a preschool physical education curriculum. *Early Child Development and Care*, 181(3), 335–343. https://doi.org/10.1080/03004430903387461

JASP Team. (2023). *JASP (Version 0.17.2) [Computer software].*

Jones, D., Innerd, A., Giles, E. L., & Azevedo, L. B. (2021). The association between physical activity, motor skills and school readiness in 4–5-year-old children in the northeast of England. *International Journal of Environmental Research and Public Health*, *18*(22), 1–13. https://doi.org/10.3390/ijerph182211931

Kalaja, S., Jaakkola, T., Liukkonen, J., & Watt, A. (2010). Fundamental movement skills and motivational factors influencing engagement in physical activity. *Perceptual and Motor Skills,* 111(1), 115–128. https://doi.org/10.2466/06.10.25.PMS.111.4.115-128

Kastelic, A., Kovač, M., & Marinšek, M. (2022). Spremembe v lokomotornih spretnostih učencev in učenk od 1. do 5. razreda osnovne šole. In M. Kovač, M. Plavčak, & L. Dobovičnik (Eds.),

Zbornik 35. strokovnega in znanstvenega posveta športnih pedagogov Slovenije. (pp. 66–81). Prebold: Zveza društev športnih pedagogov Slovenije.

Kovač, M., Markun Puhan, N., Lorenci, B., Novak, L., Planinšec, J., Hrastar, I., Pleteršek, K., & Muha, V. (2011). *Učni načrt za športno vzgojo - osnovna šola [Curriculum for physical education - primary school]*. Ministrstvo RS za šolstvo in šport, Zavod RS za šolstvo.

Logan, S. W., Robinson, L. E., Wilson, A. E., & Lucas, W. A. (2012). Getting the fundamentals of movement: A meta-analysis of the effectiveness of motor skill interventions in children. *Child: Care, Health and Development*, 38(3), 305-315.

Lloyd, M., Saunders, T. J., Bremer, E., & Tremblay, M. S. (2014). Long-term importance of fundamental motor skills: A 20-year follow-up study. *Adapted Physical Activity Quarterly*, 31(1), 67-78.

Marinšek, M., Bedenik, K., & Kovač, M. (2023). Psychometric Proprieties of the Slovenian Version of the Test of Gross Motor Development–3. *Journal of Motor Learning & Development*, *11*, 209–223.

Marinšek, M., Štopfer, N., & Kovač, M. (2023). Analiza izvedbe temeljnih lokomotornih spretnosti v zgodnjem otroštvu. *Vzgojiteljica: Revija za dobro prakso v vrtcih*, 25(2), 8–12.

Singer, R. N. (1977). To Err or Not to Err: A Question for the Instruction of Psychomotor Skills. *Review of Educational Research*, 47(3), 479–498

Stodden, D., Goodway, J. D., Langendorfer, S., Roberton, M. A., Rudisill, M. E., Garcia, C., & Garcia, L. E. (2008). A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest*, 60(2), 290-306.

Pavlič, N., Kovač, M., & Marinšek, M. (2022). Spremembe v gibalnih spretnostih ravnanja z žogo učencev in učenk od 1. do 5. razreda osnovne šole. In M. Kovač, M. Plavčak, & L. Dobovičnik (Eds.), *Zbornik 35. strokovnega in znanstvenega posveta športnih pedagogov Slovenije.* (pp. 98–110). Prebold: Zveza društev športnih pedagogov Slovenije.

Robinson, L. E., & Goodway, J. D. (2009). Instructional climates in preschool children who are at-risk. Part I: Object-control skill development. *Research Quarterly for Exercise and Sport,* 80(3), 533-542.

Wick, K., Leeger-Aschmann, C. S., Monn, N., Radtke, T., Ott, L. V., Rebholz, C. E., ... & Gerber, M. (2017). Interventions to promote fundamental movement skills in childcare and kindergarten: A systematic review and meta-analysis. *Sports Medicine*, 47(10), 2045-2068.

Zhang, D., Soh, K. G., Chan, Y. M., & Zaremohzzabieh, Z. (2024). Effect of intervention programs to promote fundamental motor skills among typically developing children: A systematic review and meta-analysis. *Children and Youth Services Review*, 156, 107320. https://doi.org/10.1016/j.childyouth.2023.107320

Cycling in Kindergarten: Highlighting Aspects of Integrating Cycling in Educational System

Jera Gregorc, Vesna Štemberger
Univetrsity of Ljubljana, Faculty of Education, Ljubljana, Slovenia
jera.gregorc@pef.uni-lj.si, vesna.stemberger@pef.uni-lj.si

In this paper we examine the importance of including cycling in the educational system, starting at pre-school age. 74 children aged 4-5 years, 74 parents of 4-5 year olds and 4 preschool teachers participated in the study. We investigated the differences in the parents' and teachers' assessment of the children's cycling skills. We found that parents rated all observed cycling skills of their children better than preschool teachers (Wilcoxon signed ranks test: TS = 184.5 (74); $p < 0.001$). Children who find better conditions for cycling in their family environment are more skillful (Mann-Whitney test: U = 844.0 (74), $p < 0.042$), but the cycling skills of the children do not correlate with the cycling frequency of their parents (Spearman's rank correlation test: ro = -0.163 (74), $p < 0.164$). We conclude that it would be worthwhile to systematically introduce cycling both in preschool and in preschool teacher education.

University of Maribor Press

KOLESARJENJE V VRTCU: OSVETLITEV NEKATERIH VIDIKOV VKLJUČEVANJA KOLESARJENJA V VZGOJNO-IZOBRAŽEVALNI SISTEM

JERA GREGORC, VESNA ŠTEMBERGER

Univerza v Ljubljani Pedagoška fakulteta, Ljubljana, Slovenija
jera.gregorc@pef.uni-lj.si, vesna.stemberger@pef.uni-lj.si

V prispevku raziskujemo pomen vključitve kolesarjenja v vzgojno-izobraževalni sistem, in sicer že v predšolskem obdobju. V raziskavi je sodelovalo 74 otrok, starih 4–5 let, 74 staršev teh otrok in 4 vzgojitelji. Preverili smo razlike v ocenah kolesarskih spretnosti otrok, če jih ocenjujejo starši in če jih ocenjujejo vzgojitelji. Ugotovili smo, da so starši vse opazovane kolesarske spretnosti svojih otrok ocenili bolje kot vzgojitelji (Wilcoxonov test predznačenih rangov: TS = 184,5 (74); p < 0,001). Otroci, ki imajo v svojem družinskem okolju boljše pogoje za kolesarjenje, so spretnejši (Mann-Whitneyev test: U = 844,0 (74), p < 0,042), toda kolesarska spretnost otrok se ne povezuje s pogostostjo kolesarjenja njihovih staršev (Spearmanov test korelacije: ro = − 0,163 (74), p < 0,164). Sklepamo, da bi bilo smiselno sistematično vpeljati kolesarjenje tako v predšolsko obdobje kot v izobraževanje vzgojiteljev.

1   Introduction

Cycling is anchored in the Slovenian education system (ES) both in the kindergarten curriculum (in the area of movement) and in the curricula for physical education in primary, secondary and grammar schools, but not as a compulsory subject, but only as one of the options for achieving the goals in the area of movement or sport. It is mentioned as part of additional content (e.g. Little and Golden Sunshine) and as possible content for sports days. In the second third of primary school, it is defined as a regular and extended programme of school life and work, where the school offers cycling training and a cycling test. For example, the Regulation on Norms and Standards for the Implementation of the Primary School Curriculum (Official Gazette of the Republic of Slovenia No. 57/07, 65/08, 99/10, 51/14 and 64/15) sets the standard for learning and testing practical road traffic for the cycling test in the elementary school curriculum at 5 hours per year for a group of five pupils. 5 hours per year for a group of five pupils is the standard for learning and testing practical driving in road traffic for the bicycle test as part of the elementary school curriculum.

Children, pupils and students are more likely to cycle alone or accompanied by their parents than in EC facilities. Parental cycling education is of course not required, so it may be worth considering the need for a more comprehensive introduction of cycling in EC, starting with pre-school education.

The justification for integrating cycling into the education system is driven by two fundamental challenges:

- Cycling as an independent basic motor skill that contributes to health maintenance, skill development and skill acquisition.
- Cycling as an alternative means of transportation for shorter distances that protects the environment and respects coexistence.

We believe that both challenges cannot and should not be left to parents to achieve. We base our argument on the differences in knowledge or assessment of cycling skills between preschool teachers (experts) and parents.

2   The Importance of Exercise for Maintaining Health

Research on the importance of exercise in maintaining health has focused on various aspects of health, particularly cardiovascular disease (Warburton et al., 2006; Lee et al., 2016), various mental health conditions (Schuch et al., 2016; Lubans et al.) and World Health Organization guidelines (Bull et al., 2020). Chaput et al. (2020) analyzed various studies that showed differences in the intervention programs. These programs differed in duration, training intensity, frequency and content and were aimed at different groups of people with different ages and health status.

In recent decades, systematic analyzes of these studies have increasingly been conducted to identify commonalities and provide guidelines on the importance, frequency, intensity and type of physical activity for health. For example, Guthold et al. (2018) found that a quarter of adults do not achieve the recommended level of aerobic physical activity, while more than three-quarters of adolescents do not (Guthold et al., 2020). This data underscores the urgent need to increase efforts and investment in programs to promote physical activity.

The World Health Organization updated its guidelines in 2020 based on the growing body of research (Bull et al., 2020). These guidelines apply to children, adolescents and adults.

2.1   Recommendations for children and adolescents (5-17 years)

In line with research suggesting that at least 60 minutes of moderate to vigorous physical activity daily improves physical, mental and cognitive health (Chaput et al., 2020), this is now a new recommendation for physical activity for children and adolescents. While no specific types of physical activity are prescribed, additional physical activity is associated with additional benefits. Prolonged sedentary behavior, especially in front of screens, is associated with negative health outcomes (Bull et al., 2020).

2.2 Recommendations for Adults (18-64 Years)

For adults, a weekly series of aerobic and musculoskeletal exercises is recommended. The benefits of aerobic activity are seen at 150 to 300 minutes of moderate-intensity or 75 to 150 minutes of vigorous-intensity exercise per week, a notable change from the 2010 guidelines, which prescribe at least 3 x 30 minutes per week (Bull et al., 2020).

2.3 Evaluation of the implementation of the recommendations

Measuring physical activity is challenging and requires different methods and tools to understand and evaluate the implementation of the WHO recommendations (Bull et al., 2020). Hammond-Haley et al. (2021) suggest a combination of approaches, including surveys and physical measurements (e.g. with wearable devices). Schoeppe et al. (2014) found that free play or unorganized school walks are not sufficient to achieve moderate-intensity physical exertion. Adequate training is crucial, as research shows that parents cannot properly assess their children's abilities without appropriate training (Scott et al., 2012).

2.4 Cycling as an independent component of basic movement skills

Fundamental movement skills (FMS) form the basis for more complex movements traditionally categorized as stability, locomotion and manipulation movements (Gallahue et al., 2011). Kavanagh et al. (2020) argue that cycling, especially on a bicycle without pedals, should be considered a new FMS subcomponent. Significant correlations were found between cycling ability and the FMS subcomponents (locomotor, manipulation and stability).

2.5 Cycling as a strategy to reduce the ecological footprint

In response to the global challenge of physical inactivity, the World Health Organization has set a target to reduce it by 15% by 2030 and has called on countries to formulate strategies, policies and programs (Bull et al., 2020). The main beneficiaries of these guidelines are policy makers in various sectors that have an impact on physical activity, such as curriculum developers, planners and infrastructure operators. We advocate early promotion of cycling that is consistent

with the overarching goal of reducing greenhouse gas emissions, particularly those from the transport sector. According to the European Environment Agency (2019), transport accounted for 27% of total emissions in 2017, with 15% of this share coming from vans and cars.

The current trends in commuter traffic in Slovenia underline the need for a comprehensive approach to address them. This approach should include integrated planning and infrastructure development, alternative modes of transportation (busses, minibusses , trains, etc.), integrated education and training solutions and a change in practices. Data from the Daily Traveler Mobility Survey published by the Spatial Policy Institute (2020) shows that 19% of people use cars for very short trips (up to 1 km) and 60% for trips up to 5 km.

An in-depth analysis carried out as part of a 2014 European Union study sheds light on the predominant mode of transportation on an average day. The car dominates at 54%, followed by public transport at 19%. Pedestrians and cyclists together make up 22%, with cyclists accounting for 8% of all modes of transport.

The aim of our research is to investigate possible differences in how parents and educators assess their children's cycling skills. We also want to determine whether these assessments vary according to cycling facilities (infrastructure) and whether there is a correlation between children's cycling skills and parents' cycling frequency. If there are differences in these aspects, a systematic integration of cycling skills in all educational institutions, starting with pre-school education, would be justified. In addition, we want to identify opportunities for infrastructure development to further promote and facilitate cycling.

3   Method

The study followed the paradigm of quantitative research and used a non-experimental method of pedagogical research.

3.1 Sample

A sample consist of 74 4-5 year old children and 74 parents of 4-5 year old children and 4 preschool teachers. Of the participants, 66 children and parents (44.6%) lived in areas that were conducive to cycling (e.g., bike lanes, bike polygons, large paved areas without cars, etc.), while 82 children and parents (55.4%) lived in areas that were less conducive to cycling (e.g., greater distance from roads with bike lanes, no large paved areas for cycling, steep inclines, etc.).

3.2 Variables

Two types of variables were included. The first was a questionnaire for parents that contained three types of questions. The first question related to cycling infrastructure, the second to the frequency of cycling and the third to the assessment of their children's cycling skills. The children's rating related to free riding, swerving and stopping, with parents rating on a scale of 1 (does not perform the task) to 5 (performs the task without stopping or making mistakes). The second type involved a specific assessment of cycling skills determined by a polygon test. The test included three skills (free riding, swerving and stopping) and the scoring criteria were the same as those presented to parents. Each child received between 1 and 5 points for each skill, depending on whether they completed the task with or without errors.

3.3 Method of data collection

Parents received the questionnaire with an individual code during a parents' meeting in the first week of September 2023, with instructions to complete and return it. They were informed that the questionnaires had unique codes that allowed the data to be merged with the information about their child. The codes were later permanently deleted to ensure complete anonymization of the data. Parents based their assessments on their knowledge of their children's cycling skills. The actual assessment of the children took place the following week when they rode their bicycles on a prepared polygon and were assessed according to the same criteria that had been given to the parents.

3.4   Method of data processing

The collected data was first harmonized and anonymized and then processed with the statistical software SPSS. The normality of the distribution was tested using the Kolmogorov-Smirnov test. Due to its statistical properties, the non-parametric Wilcoxon rank sum test was used instead of the parametric T-test for paired samples and the Mann-Whitney U-test instead of the T-test for independent samples. The Spearman rank correlation coefficient was used to determine the relationships between numerical variables, with statistical significance set at a risk level of 5%.

4   Results

We present the results according to the research questions. The first research question was: To what extent do children's cycling skills differ when assessed by experts or their parents?

Table 1: Differences in the mean rating of children's cycling skills by rater

Rater:	Free riding	Swerving	Stopping	Overall rating
Parent	4.64	4.43	4.45	13.51
Preschool teacher	4.32	3.81	4.08	13.05

Source: own

Table 1 shows that the ratings vary between parents and experts. The smallest differences can be found in free riding. Both rated the child's ability to ride freely about the same, while the ratings for swerving and stopping were different. Due to the non-normal distribution of the data, we used the non-parametric Wilcoxon rank sum test to find statistically significant differences. This showed that the differences in the overall ratings were statistically significant (TS=184.5 (74); $p < 0.001$). It can be seen that the parents rated their children better than the experts in all the skills observed.

In the following, we wanted to find out to what extent better conditions contribute to better skills.

Table 2: Differences in the children's average cycling skills (expert assessment) depending on the infrastructure in which the children live

Infrastructure:	Free riding	Swerving	Stopping	Overall rating
Poorer conditions	4.49	3.43	3.64	11.18
Better conditions	4.12	4.12	4.44	13.05

Source: own

Table 2 shows that the results of children living in better conditions differ in all tasks from those of children living in poorer conditions. The difference is again smallest in the "free riding" task. Due to the non-normal distribution of the data, a non-parametric Mann-Whitney U test was used to determine statistically significant differences, which showed that the differences were statistically significant (Mann-Whitney U =844.0 (74), p < 0.042).

The third research question was: To what extent are children's cycling skills related to parents' cycling frequency?

Table 3: Correlation between the overall assessment of cycling skills (preschool teachers assessment) and the frequency of cycling by parents

Spearman's rho	Frequency of cycling	
Expert assessment	Correlation Coefficient	-.163
	Sig. (2-tailed)	.164
	N	74

Source: own

Table 3 shows that there is no statistically significant correlation between the frequency of cycling by parents and the overall assessment of children's cycling competence.

5   Discussion and conclusions

Cycling, identified by Kavanagh et al. (2020) as a fundamental motor skill (FMS) and recognized as a physical activity in its own right, is consistent with locomotor, manipulative and stability movements within the FMS (Goodway et al., 2021). These fundamental skills, which are critical for sport-specific skills, develop during the preschool years as children actively explore their bodies and environments (Altunsoez, 2015). Therefore, the systematic development of FMS, including cycling, is a worthwhile endeavor. Kavanagh et al. (2020) argue that FMS assessment tests

should be integrated into curriculum design and teaching materials and justify the inclusion of cycling in these assessments.

In answering the first research question, our results show a discrepancy between professional and parental assessments of children's cycling skills. Professionals (preschool teachers) tend to be more critical in their assessments, while parents are often more satisfied with their children's level of learning. This is consistent with the observations of other researchers (Scott et al., 2012), who also found that parents may not be realistic in their assessment of their children's skills and knowledge. This underscores the importance of integrating cycling into early childhood education curricula and educator training at the college level.

Regarding the second research question, our study confirms the importance of infrastructure for cycling competence. In contrast to some studies (Zajec et al., 2010), which found that material conditions are not related to the frequency of physical activity and motor learning levels, our study emphasizes the specificity of cycling. It is directly related to suitable material conditions, which include both bicycles and suitable infrastructure.

The third research question investigated the relationship between children's cycling skills and their parents' cycling frequency. In contrast to the findings of previous studies (Strniša and Planinšec, 2014), which suggest that more physically active parents have similarly active children, and (Schoeppe et al, 2014), which emphasize the inadequacy of free play for achieving moderate physical activity, no statistically significant relationship (Table 3) was found in our study between children's competence scores and parents' cycling frequency (Spearman's rho coef = -.163 (74), $p < 0.164$). Therefore, we believe that it makes more sense to integrate cycling into the curriculum rather than relying on parents to increase their cycling frequency.

To summarize, our study provides convincing arguments for the integration of cycling into early childhood education. Future research should address the specific material requirements, especially infrastructure, needed for successful implementation of cycling in educational settings. In addition, research into optimal organizational forms for cycling in the general education system would further increase the effectiveness of integration.

References

Altunsöz, I. H. (2015). Motor skill interventions for young children. Beden Eğitimi Ve Spor Bilimleri Dergisi, 9(1), 133-148.

Bull, F. C., Al-Ansari, S. S., Biddle, S., et al. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine, 54*, 1451-1462.

Chaput, J. P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., Jago, R., Ortega, F. B., & Katzmarzyk, P. T. (2020). 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5-17 years: summary of the evidence. *The International Journal of Behavioral Nutrition and Physical Activity, 17*(1), 141. https://doi.org/10.1186/s12966-020-01037-z

Goodway J.D., Ozmun J.C., Gallahue D.L. (2021). *Understanding Motor Development: Infants, Children, Adolescents, Adults*. 8th ed. Jones & Bartlett Learning; Burlington, MA, USA.

Guthold, R., Stevens, G. A., Riley, L. M., et al. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Global Health, 6*, e1077–86. https://doi.org/10.1016/S2214-109X(18)30357-7

Guthold, R., Stevens, G. A., Riley, L. M., et al. (2020). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. *Lancet Child Adolesc Health, 4*, 23–35. https://doi.org/10.1016/S2352-4642(19)30323-2

Hammond-Haley, M., Allen, C., Han, J., Patterson, T., Marber, M., & Redwood, S. (2021). Utility of wearable physical activity monitors in cardiovascular disease: a systematic review of 11,464 patients and recommendations for optimal use. *European Heart Journal Digital Health, 2*(2), 231–243. https://doi.org/10.1093/ehjdh/ztab035

Jakicic, J. M., Powell, K. E., Campbell, W. W., Dipietro, L., Pate, R. R., Pescatello, L. S., Collins, K. A., Bloodgood, B., Piercy, K. L., & 2018 PHYSICAL ACTIVITY GUIDELINES ADVISORY COMMITTEE* (2019). Physical Activity and the Prevention of Weight Gain in Adults: A Systematic Review. *Medicine and Science in Sports and Exercise, 51*(6), 1262–1269. https://doi.org/10.1249/MSS.0000000000001938

Kavanagh, J. A., Issartel, J., & Moran, K. (2020). Quantifying cycling as a foundational movement skill in early childhood. *Journal of Science and Medicine in Sport, 23*, 171–175. https://doi.org/10.1016/j.jsams.2019.08.020

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., & Katzmarzyk, P. T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The Lancet, 380*(9838), 219–229.

Lubans, D., Richards, J., Hillman, C., Faulkner, G., Beauchamp, M., Nilsson, M., Kelly, P., Smith, J., Raine, L., Biddle, S., & Biddle, S. (2016). Physical activity for cognitive and mental health in youth: A systematic review of mechanisms. *Pediatrics, 138*(3), e20161642.

Marquez, D. X., Aguiñaga, S., Vásquez, P. M., Conroy, D. E., Erickson, K. I., Hillman, C., Stillman, C. M., Ballard, R. M., Sheppard, B. B., Petruzzello, S. J., King, A. C., & Powell, K. E. (2020). A systematic review of physical activity and quality of life and well-being. *Translational Behavioral Medicine, 10*(5), 1098–1109. https://doi.org/10.1093/tbm/ibz198

Schuch, F. B., Vancampfort, D., Richards, J., Rosenbaum, S., Ward, P. B., & Stubbs, B. (2016). Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. *Journal of Psychiatric Research, 77*, 42-51.

Scott Jr, S., Blake, J., & Kim, E. (2012). Differences in Parent and Teacher Ratings of Preschool Problem Behavior in a National Sample: The Significance of Gender and SES. *Journal of Early Intervention, 34*, 151-165. https://doi.org/10.1177/1053815112461833

Schoeppe, S., Duncan, M. J., Badland, H. M., et al. (2014). Associations between children's independent mobility and physical activity. *BMC Public Health, 14,* 91. https://doi.org/10.1186/1471-2458-14-91

Strniša K., & Planinšec J. (2014). Gibalna dejavnost otrok z vidika socialnoekonomskih razsežnosti. *Journal of Elementary Education*, *7*(1), 99-108. Retrieved from https://journals.um.si/index.php/education/article/view/451

Ubago-Guisado, E., Jürimäe, J., & Gracia-Marco, L. (2023). Editorial: Physical activity and fitness for the prevention and management of bone diseases. *Frontiers in Physiology, 14*, 1185201. https://doi.org/10.3389/fphys.2023.1185201

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: The evidence. *CMAJ: Canadian Medical Association Journal = Journal de l'Association medicale canadienne, 174*(6), 801–809. https://doi.org/10.1503/cmaj.051351

Zajec, J., Videmšek, M., Štihec, J., Pišot, R. in Šimunič, B. (2010). *Otrok v gibanju doma in v vrtcu.* Koper: Univerza na Primorskem, Znanstveno-raziskovalno središče Koper – Inštitut za kineziološke raziskave, Univerzitetna založba Annales.

NUMERICAL – DESCRIPTIVE – CATEGORICAL: TEACHERS' EXPERIENCES AND OPINIONS ON PHYSICAL EDUCATION ASSESSMENT IN PRIMARY SCHOOL

VESNA ŠTEMBERGER,[1] JOCA ZURC[2]
[1] University of Ljubljana, Faculty of Education, Ljubljana, Slovenia
vesna.stemberger@pef.uni-lj.si
[2] University of Maribor, Faculty of Arts, Maribor, Slovenia
joca.zurc@um.si

Physical education assessment is one of the most challenging forms of assessment in school, as it aims to objectively assess the pupils' knowledge while promoting a positive attitude towards sport and lifelong physical activity to maintain health. Through an empirical qualitative study using a focus group approach, we aimed to gain insight into the experiences and opinions of teachers about assessment in physical education (PE). Five class teachers and five PE teachers, each with at least 15 years' experience teaching the 3rd to 9th grades in primary school, participated in two focus groups. The results of the qualitative content analysis revealed five key themes: the impact of numerical assessment on self-image, pupils' attitude towards the subject and interest in sport, the factors influencing pupils' intrinsic motivation to engage in sport, the methodology of assessment, and the advantages and disadvantages of numerical assessment.

ŠTEVILČNO – OPISNO – BESEDNO: IZKUŠNJE IN MNENJA UČITELJEV O OCENJEVANJU PRI PREDMETU ŠPORT V OSNOVNI ŠOLI

VESNA ŠTEMBERGER,[1] JOCA ZURC[2]

[1] Univerza v Ljubljani, Pedagoška fakulteta, Ljubljana, Slovenija
vesna.stemberger@pef.uni-lj.si
[2] Univerza v Mariboru, Filozofska fakulteta, Maribor, Slovenija
joca.zurc@um.si

Ocenjevanje pri predmetu šport je eno izmed najbolj zahtevnih področij ocenjevanja v vzgojno-izobraževalnem sistemu, saj je njegov cilj korektna in objektivna ocena znanja učenca ter hkrati razvoj pozitivnega odnosa do športa in vseživljenjskega ukvarjanja s telesno dejavnostjo v funkciji ohranjanja zdravja. Z empirično kvalitativno raziskavo s pristopom fokusne skupine smo želeli pridobiti vpogled v izkušnje in mnenja učiteljev o ocenjevanju pri predmetu šport. V fokusni skupini je sodelovalo 5 učiteljev razrednega pouka in 5 učiteljev športa, ki so imeli nad 15 let izkušenj ter so poučevali v enem od 3. do 9. razreda osnovne šole. Rezultati kvalitativne vsebinske analize so razkrili pet osrednjih tem, kot so vpliv številčnih ocen na samopodobo, odnos do predmeta in interes za športne dejavnosti pri učencih, dejavniki, ki vplivajo na notranjo motivacijo učencev za ukvarjanje s športom, načini pridobivanja ocen, prednosti ter pomanjkljivosti številčnega ocenjevanja.

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

509

1 Introduction

Regular physical activity has a significant correlation with health, and more active individuals show more favourable outcomes in several psychophysical health indicators. Moreover, the level of physical activity in adulthood has been shown to be strongly related to the exercise habits formed during childhood and adolescence (Pangrazi, 2000). Therefore, regular participation in physical education (PE) in primary school is of paramount importance, as in addition to promoting an active lifestyle it can encourage a positive experience of sport, the acquisition of various motor skills, the development of motor abilities and motor functionality, and the formation of a healthy lifestyle (Kovač et al., 2011). Research shows that a sense of competence in PE is important for pupils who strive to appear competent in sport in front of their peers or classmates (Tremblay et al., 2000). Achievements in PE or the related grades can thus be an essential factor in shaping a pupil's self-image in this context (Štemberger, 2001).

Assessment of PE is one of the most challenging areas of school evaluation, as the aim is to assess knowledge and skills fairly and objectively while at the same time instilling a positive attitude towards sport and raising pupils' awareness of the importance of lifelong participation in it as a way of maintaining health. The assessment should thus not adversely affect pupils' perception of sport and its importance in everyday life. The aim of PE is to support the development of optimal exercise habits among pupils and positively impact their self-image, increasing the chances of lifelong participation in sport, and this is unlikely to be achieved if we look for their weak areas in the assessment. It is to be expected that a pupil who does not do well in PE will avoid sporting activities, not only at school but also in their leisure time. However, research shows that the amount of sport a pupil is involved in – both in and out of school – is an important contributor to better school performance (Booth et al., 2014), the management of behavioural problems (Zurc et al., 2022), as well as to regular participation in sport in adulthood (Lahti et al., 2018).

In this paper, we present the fundamental features of PE assessment in primary school, the guidelines for its assessment and the different views that characterise assessment in this educational area. Through an empirical qualitative study with a focus group approach, we aimed to gain insight into the opinions of class teachers

and PE teachers teaching in primary school at grades 3 to 9, their experiences, views and opinions on numerical assessment of PE in terms of school performance and the promotion of pupils' positive attitudes toward and enjoyment of daily physical activity.

2   PE assessment in school

Assessment of PE is often neglected due to the nature of the subject, but at the same time there is an urgent need for it. Quality assessment of PE requires, first and foremost, the proper planning and implementation of the pedagogical process, in which the teacher, following the curriculum (Kovač et al., 2011), primarily assesses the pupil's motor knowledge, taking into account individual changes in physical and motor development. It considers that pupils are different, as their characteristics and abilities depend on their dispositions, previous experiences and the social environment in which they live. It sets individual goals, finds the content in which they will be successful, differentiates methodological procedures and emphasises the importance of their progress. (Ibid., p. 52)

Since the 1996 school reform in Slovenia and the introduction of nine-year schooling, assessment has been descriptive and numerical in primary school and numerical only in secondary school. Initially, a descriptive assessment was intended for pupils in the first and partly in the second educational cycle. However, since the amendment of the Primary School Act pupils have been assessed by descriptive assessment only in the first and second educational grades. Despite the opposition of some experts (Kristan, 2009), Lorenci (2000) believes that the only question about assessment in the PE may be what type of assessment it should be (numerical, categorical, descriptive), and not whether or not to assess the PE.

2.1   Recommendations for PE assessment

The assessment of PE should be based on an integrated or holistic approach to assessment and grading (Kovač et al., 2004). This means that assessment and grading should primarily encourage teachers to improve the quality of their teaching and motivate pupils to engage in physical activity. Quality teaching is and should be the foundation of any objective assessment (Hay & Penney, 2009). Assessment should

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

511

thus incentivise pupils to participate in sport and indirectly assess the teacher's performance (Kovač et al., 2011).

The PE curriculum (Kovač et al., 2011) identifies three aspects of monitoring and assessing pupils' progress, namely (1) the level of acquisition of sport skills, (2) monitoring personal sport performance, and (3) monitoring the pupil's physical, functional and motor development. The regular monitoring of and feedback on the data collected on pupils' progress, as well as the observation and analysis of the process of work, enable teachers to plan the educational process accordingly, to adapt lessons to the individual, to advise on improving performance and to involve pupils in various extracurricular sporting activities.

The curriculum in Slovenia states that the teacher should consider the following principles when assessing pupils in PE (ibid., p. 52):

- The assessment should focus primarily on the pupil's motor skills, considering individual changes in physical and motor development;
- The basis for evaluation is the achievement of knowledge and skills according to related educational cycle;
- The assessment should take place when the practical and theoretical content has been completed and mastered by most pupils;
- The assessment criteria must be communicated to all pupils at the beginning of the school year;
- Different assessment methods are used, and different areas are assessed, namely performance, written, oral and other products;
- In the first and second educational cycles, the assessment should focus on selected core competences and, in the last educational cycle, on applying competences in different situations;
- Assessment of knowledge and skills must comply with the current legislation.

3   Empirical study

The survey was conducted as part of an evaluation study entitled *Analysis of the Suitability of Numerical Assessment in Sports, Music and Visual Arts.* The research aimed to analyse numerical assessment of PE, fine arts and musical arts, from grades 3 up

to 9, in terms of assessing pupils' progress, the achievement of the objectives of primary school education, teachers' competence in identifying pupils' predispositions and evaluating their knowledge, and the implementation of curricula related to testing and assessment (Usenik et al., 2022).

Following the research objectives, quantitative and qualitative research approaches were used to collect and analyse the data from the perspectives of pupils and teachers. By integrating both quantitative and qualitative methods, the researchers aimed to provide a holistic understanding of the research problem arising from concrete situations of school practice, actively involving the research participants (Zurc & Ferligoj, 2023). In the present paper, we focus on the results relating to teachers' experiences and opinions about assessing pupils' knowledge of PE using a qualitative focus group research approach (Klemenčič & Hlebec, 2007).

3.1 Methods

The selection of participants for the focus group was based on a sampling of teachers who teach PE from grades 3 to 9 in one of the 48 selected primary schools. The sample of schools was selected from a representative stratified sample of the total population of primary schools in Slovenia, which was used in the quantitative part of the study (Usenik et al., 2022) and represented an even representation of primary schools across all 12 Slovenian statistical regions. The focus group on the assessment of PE involved five class teachers and five PE teachers. Three female and two male teachers participated in a focus group with class teachers, and two female and three male teachers participated in a focus group with PE teachers. All the participants had at least 15 years of experience teaching PE, and of conducting numerical assessments, and were currently employed in a primary school. The more experienced teachers for the focus groups were purposively selected. We wanted to include the perspectives of school professionals with longer experience and insight into the practise of PE teaching and assessment in primary schools, which have undergone intense change over the last 25 years when the nine-year primary school was introduced. All participants in our focus groups have witnessed these changes over the last two decades and have similar experience and knowledge of PE assessment.

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

513

In Slovenian primary schools, class teachers can teach PE from grade 3 to grade 5, and PE teachers have experience in teaching PE up to grade 9. Therefore, we collected data separately by conducting two focus groups with the same questions. First, a focus group with class teachers and then a focus group with PE teachers were implemented, with each teacher participating in only one group. Both focus groups were conducted remotely, using the Zoom application. The teachers were provided with the initial discussion topics when they were invited to participate in the groups.

The focus group on PE assessment with the class teachers was conducted on 25 May 2022 and lasted one hour and four minutes, while that with the PE teachers was held on 2 June 2022 and lasted one hour and 17 minutes. The first author of this paper carried out both focus group interviews. The discussions were moderated according to the following initial themes, which were the same for both focus groups: the main characteristics of numerical assessment of PE, approaches to obtaining grades in PE, the advantages and disadvantages of numerical assessment of PE, how numerical grades affect pupils' attitude towards PE, the development of a positive attitude to sport, the formation of a positive self-image, and the factors that influence the intrinsic motivation of pupils to engage in sport.

Data collection was carried out under the fundamental ethical principles of qualitative empirical research. All the participants voluntarily and anonymously participated in one of the focus groups, with the possibility to withdraw at any time without consequences. All items that could reveal the individual's identity were removed from the collected data.

The video conference calls of the focus groups were recorded, and audio transcriptions were made. The data analysis was carried out with a qualitative content analysis in three levels, namely (1) codes, (2) categories and (3) themes. All analysis was done by hand. The analysis was carried out in the following sequential steps (Adam et al., 2012; Zurc, 2023): (1) preparation of transcripts based on the recorded conversations; (2) reviewing and editing of the transcripts, encryption of participants' statements; (3) text coding by searching for the meaningful parts of the text that answer the research questions; (4) categorisation or synthesis of the obtained codes into categories; (5) axial coding or defining the relations between the

category and its codes; and (6) selective coding or establishing relationships between themes.

3.2 Results

The qualitative content analysis identified five central themes: (1) the influence of numerical assessment on self-image, attitude towards PE and interest in sport among pupils (28 statements); (2) factors influencing pupils' intrinsic motivation to engage in sport (28 statements); (3) methods of obtaining grades (22 statements); (4) shortcomings of PE numerical assessment (20 statements); and (5) the advantages of PE numerical assessment (14 statements). The results show that both class teachers and subject teachers who teach PE in primary school paid the most attention to the impact of numerical assessment on the pupils' self-image, attitude to and interest in sport, and to the factors that influence the pupils' intrinsic motivation to engage in sport. To a lesser extent, both groups highlighted the advantages of the numerical assessment of PE, with more advantages perceived by the class teachers than the subject teachers.

3.2.1 Methods of grading PE

In the responses of the group of class teachers, two categories emerged on the topic of grading PE: (1) formative monitoring of knowledge, and (2) the possibility of improving grades (Table 1).

Table 1: Methods of grading PE

Theme	Category	Codes
Methods of grading (22 units: 14 PE, 8 CT)	formative evaluation of knowledge (4 units, 0 PE, 4 CT)	setting criteria, setting goals, formative monitoring, giving feedback
	improving grades (4 units, 0 PE, 4 CT)	opportunity to improve grades, effort
	assessment organisation (7 units, 7 PE, 0 CT)	individual assessment, frontal, formative, avoiding stress, trying to find the best performance
	assessment context (10 units, 10 PE, 0 CT)	limited range of grades, knowledge achieved, effort, attitude, adjustment of the content

Legend: CT = class teachers; PE = physical education teachers.

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

515

The use of formative monitoring was described by class teachers as follows: "We work out the criteria together with the pupils, and then they are monitored on an ongoing basis. I give them feedback on what they still need to pay attention to. When the pupils see that they are doing well, when I know they are doing well, we decide when to assess them" (3/CT1). The class teachers pointed out that they also allow pupils to improve their grades in PE: "In our class, they can improve their grades when they feel ready, but also when I see that they are ready" (4/CT1). Most of the time, there is a time limit for improvement, e.g., "They can improve their grades here for about a month after we have assessed them" (3/CT1), or "We do have an announcement of when it will be possible to improve grades. Still, if the pupils want to show their progress sooner, they can do so" (5/CT1). However, one teacher pointed out that only those pupils who show effort can improve their grades: "Yes, they can improve their grades too, but only the ones who are making the effort can improve their grades" (5/CT1). If a pupil "flunks' and therefore has a bad grade, then they cannot improve it" (1/CT1).

In the group of PE teachers, two categories emerged in the answers regarding the assessment methods in PE: (1) the organisation of the assessment, and (2) the content of the assessment. Regarding the organisation of the assessment, teachers shared different experiences. Some grade each pupil separately while the rest of the class does something else, e.g., "I grade some of them, while the rest of them do other things on the circuit. When they come to me, I assess them" (2/PE). Other teachers assess all the pupils at the same time: "Well, I assess them all while they are engaged in an activity, and I assess them all at the same time" (5/PE). A few teachers stressed that they try to make the assessment process stress-free for the pupils, e.g., "They don't even feel like I'm grading them because we do it so quickly, without drama, and we've done a lot of practice before" (1/PE). Again, the teachers stressed that they look for knowledge and skills when grading, e.g. "I'm always looking for their best performance. If they are not good at something, they just repeat it several times, and I grade the best performance" (2/PE).

There was some disagreement among the PE teachers about how the PE assessment should look and what criteria it should be based on. For example, most participants stated that for the assessment they primarily use only grades three to five, e.g. "I only have three grades, too, although I find it really difficult to give a grade three" (4/PE). Some felt that the assessment of PE should be based on the pupil's attainment of

skills: "I think the assessment should be based on motor skills – at least that's what we were taught. We don't have a proper scale for the attitude a pupil has towards sport, so we shouldn't assess that. For example, we don't assess hygiene habits, whether they have equipment or not, either" (5/PE). Others thought that the assessment of PE should be based mainly on the effort and attitude that the pupil shows towards the subject, e.g. "When I assess a pupil, it is their attitude towards sport that is important to me. The actual ability is less important to me" (1/PE).

3.2.2   The advantages of numerical assessment of PE

Among the advantages of numerical grading, the class teachers highlighted the greater sensitivity of numerical grading compared to verbal grading and its positive impact on pupils' motivation (Table 2).

Table 2: The advantages of numerical assessment of PE

Theme	Category	Codes
The advantages of numerical assessment (14 units: 5 PE, 9 CT)	assessment sensitivity (3 units: 0 PE, 3 CT)	better sensitivity of numerical assessment, more levels on a rating scale
	motivation (8 units: 2 PE, 6 CT)	external motivation, more effort, competitiveness, responsibility
	subject equivalence (3 units: 3 PE, 0 CT)	reputation of the subject, equivalence of the subject with other subjects

Legend: CT = class teachers; PE = physical education teachers.

Regarding the greater sensitivity of the numerical ratings, the teachers noted that these offer more steps than verbal ratings. One class teacher said: "Before, we had three grades: less successful, successful and very successful; now we have five. Well, at least in theory, because in practice, I use three. But there is a big difference between a four and a five. Anyone can get a four, but for a five, they have to try hard" (2/CT1). The class teachers emphasised the motivational function of numerical grades in PE. For example, they considered that such grades were an important source of extrinsic motivation, and that they "make pupils give more of themselves, develop their skills, their potentials" (5/CT1). Moreover, some participants felt that numerical grading at the class level was also beneficial because it does not encourage competition between pupils to an extent that would be detrimental to their interpersonal relationships. As one class teacher said: "Pupils are very supportive of each other. They are happy to see a good mark for a classmate" (2/CT1).

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

517

In contrast, the only advantage of numerical grades that a PE teacher mentioned was raising the prestige of PE and the seriousness of their work: "Maybe grades are not so much a motivating factor for pupils, they are more important for parents and colleagues in other fields. A grade can be a tool for giving some seriousness to the work we do, until you have some real experience with the pupils" (2/PE). Another PE teacher stated: "There is no positive attitude of society towards knowledge in any field. We need assessment to make people value the subject. Our society is very performance-oriented, it wants grades" (1/PE).

3.2.3   The disadvantages of numerical assessment of PE

The disadvantages of numerical assessment of PE that were identified by the participating teachers include parental pressure, the emergence of anxiety and excessive competitiveness in pupils, the low informative value of the assessment, and the negative impact on motivation for the subject (Table 3).

Table 3: The disadvantages of numerical assessment of PE

Theme	Category	Codes
The disadvantages of the numerical assessment of PE (20 units: 13 PE, 7 CT)	pressure from parents (2 units: 0 PE, 2 CT)	pressure from parents
	anxiety (6 units, 3 PE, 3 CT)	fear, anxiety, stress, burden of grading
	competitiveness (4 units, 2 PE, 2 CT)	encouraging competitiveness, struggling for grades
	informative value of grading (2 units, 2 PE, 0 CT)	the low informative value of grading
	motivational impact (6 units, 6 PE, 0 CT)	negative impact, disciplining

Legend: CT = class teachers; PE = physical education teachers.

One class teacher said the following of parental pressure: "The pupils have no problem with the change to numerical assessment. They are happy with the grade as it is and know why they got it. The next day, they came to school disappointed because there was no proper support at home because they did not get a 5" (2/CT1). Another class teacher felt that numerical grading could lead to greater anxiety: "Pupils can be scared, and the next time they will not want to try something that they don't know how to do" (5/CT1). Another class teacher pointed out that numerical grades can lead to excessive competitiveness: "Numerical grades can

encourage competitiveness, pupils 'scramble' for grades. I think it is not so bad here, at the class level, but later on, especially in the last three years, it is" (4/CT1).

The PE teachers pointed out that one disadvantage of numerical assessment of PE is that "assessment brings a lot of stress, but it does not bring so much better results" (4/PE). Furthermore, they considered that assessment could have a negative effect on the pupils' motivation to engage in sport and their attitude towards it. Regarding the latter, one teacher said: "A pupil needs content that they can relate to, then they will work. Not because of a grade, not for younger pupils. The content, the way the content is delivered, the teacher, are all more important than the grade to encourage a positive attitude towards sport" (1/PE). Another teacher added: "Grading is not the way to go if you want to get pupils into sport. Assessments do not promote a positive attitude towards sport, nor allow us to get pupils to be more physically active" (2/PE).

Some of the PE teachers also felt that numerical assessment is too often used to discipline pupils. For example, one participant said: "The downside is that grades exist at all. Grades are part of the system, a tool we use to show authority" (3/PE). However, another PE teacher defended this function of numerical grades: "Yeah, well, but now imagine you don't have these grades yet. What would that mean for the school system? How would any of us survive if we didn't have grades?" (2/PE).

3.2.4 The impact of the numerical assessment of PE on pupils' self-image, attitude towards PE and interest in sport

Teachers in both focus groups highlighted the impact of numerical assessment on pupils' self-image, attitude towards PE and interest in sport (Table 4).

Table 4: The impact of numerical grades on pupils' attitude to and interest in PE

Theme	Category	Codes
The impact of numerical grades on pupils' attitude to PE and interest in sport (28 units: 16 PE, 12 CT)	self-image (12 units, 6 PE, 6 CT)	positive impact, other factors of positive impact on self-image, teacher's role, encouragement, no impact
	interest in sport (8 units, 5 PE, 3 CT)	teacher's role, no impact
	attitude towards PE (8 units, 5 PE, 3 CT)	teacher's role, no impact

Legend: CT = class teachers; PE = physical education teachers.

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

519

Among the class teachers, only one participant thought that numerical grades have a positive effect on pupil's self-image: "Grades have a positive impact on self-image. In the sense of: I tried hard, the teacher noticed it and rewarded me for my effort" (4/CT1). The other class teachers thought the teacher was more important than the assessment for developing a pupil's positive self-image, in terms of their own attitude towards the subject and their pupils, and the quantity and quality of the encouragement they given in class.

For example, one class teacher said: "The teacher's approach is more critical for developing a pupil's positive self-image than assessment. It is how the teacher relates to the pupils that is important. If you encourage them, your influence on the pupil's self-image will be positive, but otherwise not" (1/CT1). Another teacher had a similar opinion: "The grade can be a positive motivation, but the teacher's attitude is more important. It's important to value and notice the pupil. That's important for the pupil" (3/CT1). The class teachers had similar opinions in believing that peer assessment and self-assessment are important in developing a positive self-image. The latter is also encouraged by making video recordings, so the pupils can observe their progress. As one class teacher put it: "We also sometimes record ourselves and then look at the recordings and the progress made. When the pupils see themselves, they notice and believe they are making progress, and that is greater for their self-image" (2/CT1).

Similarly, the PE teachers who participated in the focus group did not see any positive impacts of a numerical grade on the pupils' self-image, attitude towards PE or interest in sport, and they were unanimous in this opinion. And as with the class teachers, the PE teachers also believed that teachers have the most significant influence in this area in terms of their approach to the pupils and how they teach. For example, one PE teacher said: "To promote the positive self-image of a pupil it's good if the teacher finds content that the pupil is good at and directs them to those activities. When a pupil succeeds it is better for their self-image than a grade" (1/PE). Other PE teachers also agreed, e.g., "It is not the grades that influence the development of a positive attitude towards sport and the pupil's self-image, but how the teacher works with the pupil" (2/PE). "If grades are supposed to influence self-image, that is fundamentally wrong. The ones we want to bring to sport are those who are less capable in this area − we need to work with such pupils, to build their self-image, not just give them a 5 and that's it" (4/PE). "If I give him a 5, I'll be the

best teacher in the world" (4/PE). Or: "The question is whether I'll get a pupil interested in sport. It's more important to teach, to be able to get close to the individual, to know how to teach them, not just what to teach them" (5/PE).

3.2.5   Factors influencing pupils' intrinsic motivation to play sport

According to the teachers, the most critical influences on pupils' intrinsic motivation to participate in sport are the teacher, the integration of movement in teaching, extracurricular activities and significant adults (Table 5).

Table 5: Factors influencing pupils' intrinsic motivation to engage in sport

Theme	Category	Codes
Factors influencing pupils' intrinsic motivation to engage in sport (28 units: 16 PE, 12 CT)	excellent teacher (16 units: 14 PE, 2 CT)	positive experiences with sport, consideration of the child's needs, good atmosphere, concern for the well-being of pupils, safe environment, encouraging attitude towards pupils
	integrating movement in teaching (6 units: 0 PE, 6 CT)	integrating movement into daily life, integrating movement in other subjects
	extracurricular activities (4 units: 0 PE, 4 CT)	without grading, free extracurricular activities
	significant adults (5 units: 2 PE, 3 CT)	parents, teacher as a role model

Legend: CT = class teachers; PE = physical education teachers.

According to the class teachers, including movement in classes other than PE has a more significant impact on pupils' intrinsic motivation to take part in sport than grades, as seen in the following comments: "Getting them to be constantly physically active so that they feel the need to move" (1/CT1); and "To include physical activity in their everyday life. Not only in PE, in all activities" (3/CT1). The class teachers stressed that it is also beneficial for pupils' interest in sport if the school offers extracurricular activities. However, one teacher said that in order to avoid the negative effects of grades, such extracurricular activities should not be achieved with the use of electives: "Not sport electives, as these are more grades and put pressure on the pupils" (2/CT1). Moreover, according to the class teachers, parents play an important role in promoting pupils' interest in sport through their own attitudes towards it. As such, one participant noted that it is important "to involve parents in different activities to promote physical activity" (4/CT1), and another participant

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

521

stated that it was important "to encourage the pupils, but above all also the parents. Parents are the most crucial" (5/CT1).

The PE teachers primarily focused on considering the pupils' needs when trying to promote their intrinsic motivation for sport. They stated that it is important that the teacher approaches the subject positively and recognises and understands each individual's needs, wishes and interests, as seen in the following comments: "To have a good time for one hour inside the classroom" (2/PE). "A pupil gets intrinsic motivation when you are not solving your own [the teacher's] problems at school, which is what grading is, but the pupil's problems – so you pay attention to the child" (3/PE). "I agree with everything you have said. But you have to start with the pupil himself, encouraging them not to do sport only for the grade but do sport as a way of life. So that they know how to play sport at a recreational level; this is the most crucial intrinsic motivation" (4/PE).

4 Discussion

Based on the statements made by the class and PE teachers in the focus groups on the numerical assessment of PE, it can be concluded that assessment in this subject is based on the objectives set out in the curriculum. The teachers reported that this tends to assess the pupils' progress in sport and the knowledge achieved, and that PE assessment offers opportunities for individuals to change their behaviours and attitudes. Formative monitoring of pupils' progress is also emphasised as necessary in PE assessment by Kovač and Jurak (2023b). Some participants in our study reported that they developed the assessment criteria with the pupils, and then monitored their progress with regard to these. The teachers stated that their pupils also have the opportunity to improve their grades after the initial ones are given, and that they are always looking for and taking into account the pupils' best performance, and generally ensure that the stress of assessment is minimised. Most teachers said that they only use grades between three and five in the PE assessment, although they disagreed as to whether the grade obtained should be based primarily on a pupil's motor skills or on their attitude towards the subject and effort made in class.

The participating teachers identified the following advantages of the numerical assessment of PE: the greater sensitivity compared to verbal assessment, the positive impacts on the pupils' motivation and approach to work in class, and raising the

subject's profile in general. In contrast, the main disadvantages of numerical assessment were: the low informative value of the assessment, the stress and anxiety of the assessment for pupils, pressure from parents, excessive competition between pupils, and the lower motivation of pupils for sport in general as well as less positive attitudes towards PE. According to the teachers who were interviewed as part of this study, numerical assessment is not an appropriate way to promote positive attitudes towards sport and a more physically active life. As a result, the teachers did not report any positive impact of numerical assessment on the pupils' self-image and attitudes towards sport. Rather than grades, the teachers stated that the teacher, their attitude towards the subject and pupils, as well as the amount and quality of encouragement given in class, are all more important for developing pupils' interest in sport and a positive self-image.

Among the factors that positively influence pupil's intrinsic motivation to participate in sport the teachers identified the inclusion of movement in other school subjects and activities, the provision of free extracurricular sport activities at school, parental involvement in sport activities, the consideration of pupil's needs, wishes and interests in PE lessons, and the teacher's attitude towards sport. The findings are in line with previous studies (Štemberger & Petrušič, 2021, 2022), which showed that different forms of teaching, the use of sports equipment and teachers' non-verbal communication are essential factors in increasing participation in sport.

4.1   Study limitations and directions for further research

Despite many strengths and valuable insights, this study also has some limitations that need to be considered. First, a qualitative methodological approach was used to gain a detailed and comprehensive insight into the experiences and opinions of class and PE teachers on PE assessment in primary schools. However, qualitative focus groups have certain limitations that lead to some disadvantages of the study, such as a small, non-random sample, which may indicate a bias in opinions and do not allow generalisation of the results to other teachers. The dynamics of the focus group depend on its members. It is conceivable that the participants could steer the discussion towards different aspects. Therefore, further studies are needed to verify our qualitative results on a representative sample of Slovenian teachers.

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

523

Second, the groups of class and PE teachers should be considered based on the differences in their knowledge and experience in teaching PE. Most importantly, class and PE teachers in Slovenian primary schools teach different age groups of pupils. Class teachers can only teach from 3rd to 5th grade, so they have experience teaching pre-adolescent pupils. At the same time, PE teachers teach students up to grade 9, so the teaching experiences of both groups are different, which was reflected in our study in their different perspectives on PE assessment. Similar studies have shown that class teachers perceive PE as an essential part of the curriculum, but also experience it as one of the more difficult subjects to teach (DeCorby et al., 2005). Future studies should, therefore, investigate in more detail why these differences occur, what factors (e.g. training, work experience, personal attitudes towards sport and physical activity) might explain them and what statistical significance exists between the professional groups.

Finally, the differences in perspectives could also be influenced by the demographic characteristics of the teachers, e.g. gender and age. These aspects were not explicitly addressed in this study. However, both focus groups had equal numbers of female and male representatives. There is a need to analyse the data by gender to identify any differences between the opinions and experiences of female and male teachers about PE assessment. The variable of work experience should also be considered by including teachers with different teaching experiences. The findings obtained in this study could only be generalised to more experienced teachers with 15 or more years of teaching experience. We hypothesise that by including the variable of years in the profession, we can better understand whether teachers' responses vary according to their length of professional experience in PE teaching. All mentioned aspects should be carefully studied using quantitative and mixed methods approaches in the future.

5   Conclusion

Our research shows that both the class and PE teachers believe that the teachers, their attitudes towards the subject and pupils, and the incentives given to the pupils are more important than numerical assessment in determining a child's attitude to and interest in sport. Therefore, the importance of assessing pupils' progress should continue to be emphasised in PE classes, alongside monitoring and evaluating (but not numerically assessing) pupils' motor skills and development. Teachers should consider the long-term goal of PE classes, which is lifelong participation in physical

activity and sport to maintain and enhance health. From that point of view, pupils should acquire as many different motor skills as possible so they have more opportunities to engage in their chosen form of physical activity in adulthood.

A number of papers have been written on the assessment of PE, and suggestions have been made about the fairest and most appropriate methods. However, there is a lack of professional literature on assessment in this context, particularly at the beginning of primary education and considering the specific developmental characteristics of pupils at this stage of schooling. More studies and additional professional training could address the existing gaps in the literature, raise the quality of primary education in PE, and help encourage lifelong physical activity among the population.

References

Adam, F., Hlebec, V., Kavčič, M., Lamut, U., Mrzel, M., Podmenik, D., Poplas Susič, T., Rotar Pavlič, D., & Švab, I. (2012). *Kvalitativno raziskovanje v interdisciplinarni perspektivi.* Ljubljana: Inštitut za razvojne in strateške analize.

Booth, J. N., Leary, S. D., Joinson, C., Ness, A. R., Tomoporowski, P. D., Boyle, J. M., & Reilly, J. J. (2014). Associations between objectively measured physical activity and academic attainment in adolescents from a UK cohort. *British Journal of Sports Medicine, 48*(3), 265−270. http://dx.doi.org/10.1136/bjsports-2013-092334

DeCorby, K., Halas, J., Dixon, S., Wintrup, L., & Janzen, H. (2005). Classroom teachers and the challenges of delivering quality physical education. *The Journal of Education Research, 98*(4), 208−220.

Hay, P., & Penney, D. (2009). Proposing conditions for assessment efficacy in physical education. *European Physical Education Review, 15(3), 389–405.*

Klemenčič, S., & Hlebec, V. (2007). *Fokusne skupine kot metoda presojanja in razvijanja kakovosti izobraževanja.* Ljubljana: Andragoški center Slovenije.

Kovač, M., Jurak, G., & Strel, J. (2004). Predlog modela in meril ter priporočila za oblikovanje ocene pri notranjem preverjanju in ocenjevanju znanja pri športni vzgoji. In M. Kovač et al. (Eds.), *Nekatera poglavja didaktike športne vzgoje v prvem in drugem triletju osnovne šole* (str. 136−153). Ljubljana: Fakulteta za šport.

Kovač, M., Markun Puhan, N., Lorenci, B., Novak, L., Planinšec, J., Hrastar, I., & Pleteršek, K. (2011). *Program osnovna šola: Športna vzgoja: Učni načrt.* Ljubljana: Ministrstvo za šolstvo in šport Republike Slovenije, Zavod Republike Slovenije za šolstvo. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_sportna_vzgoja.pdf

Kovač, M. & Jurak, G. (2023a). Ocenjevanje uokvirjajo pravilniki in didaktična priporočila učnega načrta. *SLOfit nasvet, 7*(4), 19−23.

Kovač, M. & Jurak, G. (2023b). Temelj dobrega ocenjevanja je dober pouk. *SLOfit nasvet, 7*(4), 19−23.

Kristan, S. (2009). *Pogledi na šport 1 – Šolska športna vzgoja in njeno ocenjevanje.* Ljubljana: Fakulteta za šport, Inštitut za šport.

V. Štemberger, J. Zurc: Numerical – Descriptive – Categorical:Teachers' Experiences and Opinions on Physical Education Assessment in Primary School

525

Lahti, A., Rosengren, B. E., Nilsson, J. Å., Karlsson, C., & Karlsson, M. K. (2018). Long-term effects of daily physical education throughout compulsory school on duration of physical activity in young adulthood: An 11-year prospective controlled study. *BMJ Open Sport & Exercise Medicine, 4*(1), e000360. doi: 10.1136/bmjsem-2018-000360.

Lorenci, B. (2000). Številčno ocenjevanje športne vzgoje. *Vzgoja in izobraževanje, 31*(2–3), 115–118.

Pangrazi, R. P. (2000). Promoting physical activity for youth. *Journal of Science and Medicine in Sport, 3*(3), 280–286.

Štemberger, V. (2001). Samopodoba otroka in vplivi na oblikovanje le-te. In B. Škof & M. Kovač (Eds.), *Uvajanje novosti pri šolski športni vzgoji: Zbornik referatov* (pp. 553−559). Ljubljana: Zveza društev športnih pedagogov Slovenije.

Štemberger, V., & Petrušič, T. (2021). The importance of different forms of within-class grouping and teacher's nonverbal communication for achieving higher MVPA and VPA levels in PE lessons. In S. Šalaj, & D. Škegro (Eds.), *Proceedings: 9th International Scientific Conference on Kinesiology* (pp. 439−443). Zagreb: University of Zagreb, Faculty of Kinesiology.

Štemberger, V., & Petrušič, T. (2022). Classroom teachers' views on the influence of the number of school activity props on students' physical activity. In G. Leko (Ed.), *Kinesiology in Europe: Challenges of Changes: Proceedings* (pp. 485−493). Zagreb: Hrvatski kineziološki savez. https://hrks.hr/images/Ljetna-skola-2022-final-web.pdf

Tremblay, M. S., Inman, J. W., & Willms, J. D. (2000). The relationship between physical activity, self-esteem, and academic achievement in 12-year-old children. *Pediatric Exercise Science, 12*(3), 312–323.

Usenik, J., Breznik, I., Javornik, M., Potočnik, R., Štemberger, V., & Zurc, J. (2022). *Nacionalna evalvacijska študija Analiza primernosti uporabe številčnega ocenjevanja na področju športa, glasbene in likovne umetnosti: Zaključno vsebinsko poročilo.* Maribor: Pedagoška fakulteta.

Zurc, J., Jelovčan, G., & Štemberger, V. (2022). The role of physical/sports activities in coping with behaviour problems among primary school students. *Revija za elementarno izobraževanje, 15*(4), 409−425. doi: 10.18690/rei.15.4.409-425.2022.

Zurc, J. (2023). Fokusna skupina kot metodološki pristop v evalvaciji in zagotavljanju kakovosti visokošolskega izobraževanja. In A. Mlekuž, & I. Žagar (Eds.), *Raziskovanje v vzgoji in izobraževanju: Izobraževanje učiteljic in učiteljev za raziskovalno učenje in poučevanje. 8. znanstvena konferenca* (pp. 39-40). Ljubljana: Pedagoški inštitut. https://www.pei.si/wp-content/uploads/2023/09/1_zbornik_cel_2023.pdf

Zurc, J., & Ferligoj, A. (2023). Integracija kvantitativne in kvalitativne metodologije v družboslovnem raziskovanju. In A. Istenič, et al. (Eds.), *Upbringing and education between the past and the future* (pp. 511-528). Koper: Založba Univerze na Primorskem. https://www.hippocampus.si/ISBN/978-961-293-255-8.pdf

Students' Participation in Sport - Students' Involvement in the Decision Process about Sports Activities

Mara Sesar,[1] Bernardica Horvat Petravić,[2]
Violeta Valjan Vukić[3]
[1] University of Zagreb, Faculty of Humanities and Social Sciences, Zagreb, Croatia
mstojana@ffzg.unizg.hr
[2] Grigor Vitez Kindergarten, Samobor, Croatia
bernardica.petravic@gmail.com
[3] University of Zadar, Department of Teachers' and Preschool Teachers' Education,
Zadar, Croatia
vvukic@unizd.hr

The topic of student participation in sport emphasises the importance of the student's role in choosing the sport of choice. The aim of this work is to determine the appearance of children's participation models in the choice of sports. For the purpose of the study, a questionnaire was created to answer questions about participation in sport, focussing on the choice of desired sport. The respondents were primary school pupils in seventh and eighth grade (N=107). The results of this survey confirm the pupils' positive attitude towards sport and a high degree of autonomy in choosing their favourite sport. No differences in participation were found in relation to gender. However, students were not informed about the intensity, dynamics and benefits that sport has for them. The student responses in this study prompted further reflection on the importance of student participation in choosing the sport of choice.

Participacija učencev v športu- vključenost učencev v proces odločanja o športnih dejavnostih

Mara Sesar,[1] Bernardica Horvat Petravić,[2]
Violeta Valjan Vukić[3]

[1] Univerza v Zagrebu, Filozofska fakulteta, Zagreb, Hrvaška
mstojana@ffzg.unizg.hr
[2] Vrtec Grigorja Viteza, Samobor, Hrvaška
bernardica.petravic@gmail.com
[3] Univerza v Zadru, Oddelek za izobraževanje učiteljev in vzgojiteljev, Zadar, Hrvaška
vvukic@unizd.hr

Tema participacija učencev v športu poudarja pomen vloge učencev pri izbiri želenega športa. Namen tega dela je ugotoviti pojavnost modelov participacije otrok pri izbiri športa. Za namen študije je bil izdelan anketni vprašalnik, ki odgovarja na vprašanja o participaciji v športu, s poudarkom na izbiri želenega športa. Anketiranci so bili osnovnošolci sedmega in osmega razreda (N=107). Rezultati ankete potrjujejo pozitiven odnos učencev do športa in visoko stopnjo avtonomije pri izbiri želenega športa. Razlike v participaciji glede na spol niso bile ugotovljene. Dijaki niso bili obveščeni o intenzivnosti, dinamiki in koristih, ki jih ima šport zanje, kar je ena izmed predpostavk kvalitetne participacije. Odzivi učencev v tej študiji so spodbudili nadaljnji razmislek o pomenu participacije učencev pri izbiri želenega športa.

M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students'
Involvement in the Decision Process About Sports Activities

529

1 Introduction

In today's society, emphasis on student integrity is becoming more ubiquitous, and student participation in sports is a key component of that process. This work implies the importance of the active involvement of students in sports activities, that is, the importance of giving students a voice in the decision to participate in their desired sport and the importance of informing students on the sport they want to play is highlighted. Participation in sports activities does not only improve the physical health of students but they also acquire valuable experience that helps them in their emotional and social development.

1.1 Children's participation in decision making

Educational workers, trainers, managers of various activities in cooperating and conducting activities with children must think about the benefit and purpose of the participation of children. The purpose of society is to create conditions in which students develop into persons capable of making judgments, making rules, laws and adhering to them. At the beginning of the 20th century, the American educator, psychologist, reformer and philosopher John Dewey (1859 – 1952) gave importance to the creation of conditions for activating students as good citizens. Alexander Sutherland Neill (1999) considered that the happiness of a child was the starting point for making decisions on his upbringing, and that it was founded on the feeling of personal individual freedom The goal of Summerhill was to develop the child's mental balance and to teach it that happiness takes first place in life, to use childhood in freedom, in order to create personal strength and self-initiative (Kosi, 2020). Janusz Korczak, his real name Henryk Goldszmit (1878 or 1879 – 1942), was the originator of the idea of promoting children's rights. As the headmaster of an orphanage, he established a court of honor of children before which the teachers were also accountable, and the children were the ones who considered and decided on the reported cases. He thus showed his faith in the children and young people he cared for. Maria Montessori (1870-1952) dedicated her entire life to the representation of children's rights and proving their exceptional capabilities. The child was at the center of her pedagogy, and the goal was to provide the child with an environment in which it would be able to develop into an independent and responsible person. She believed that little children are the greatest opportunity to contribute to the progress of humanity (Philipps, 1999). The upbringing goal of

Maria Montessori was that of a free man capable of managing his own life. Freedom was for Maria the foundation, condition and goal of pedagogy (Seitz & Hallwachs, 1996). These knowledge and attitudes already show that children's participation is not a philosophy, but an integral part of the legal acts of institutions and society, the basis of education, which is manifested in communication and work with children. Throughout the centuries of thinking about children, it is important to raise awareness among every adult who is in contact with the various activities of children (freedom, artistic, recreational, STEM fields...) on how participation is legal, practical and moral. When in 1989, the United Nations adopted the Declaration on the Rights of the Child, they classified the child as an active participant in the social environment; the child is an active citizen, and equal, an equal member of the community in which he grows up. Legal acts, the UN Convention on the Rights of the Child, Council of Europe Strategy for the Rights of the Child (2016 – 2021), National Strategy for Children's Rights in the Republic of Croatia for the period from 2014 to 2020, The National Curriculum of the Republic of Croatia for early and preschool education, primary/elementary and secondary education - all of them prescribe the child's right to participation and active participation.

Expectations from today's society are better services in the community, better relations and progress of the community as a whole, and that society only progresses with the participation of children. Meaningful, inclusive, participatory and safe children's participation is needed. Children are ready and desiring to participate in all fields concerning their present as well as their future. Participation, as a complex concept, is realized through multiple forms that imply activity and independent action. One of the forms of participation is decision-making. The key to quality participation success lies in the models of children's participation in their communities. The offer of programs in the areas of culture, sports, free time in general, the involvement of quality staff in working with children, the diversity and availability of content to every child is fertile ground for the application and actualization of children's participation. Applicable children's participation in the local community is obtaining and sharing information about children and their life, upbringing and education, culture and free time. Children should be asked and consulted in matters concerning life in the community, realize the right to participate in decision-making on issues that are important for their life in the community.

M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students' Involvement in the Decision Process About Sports Activities

531

According to General Comment No. 20 of the Committee on the Rights of the Child (2016): "Adolescents' right to rest and free time and to freely participate in playing and recreational and artistic activities, on and off the Internet, is essential for the exploration of their identity because it enables them to explore their culture, shape new art forms, create relationships and develop as human beings. Leisure time, recreation and the arts provide adolescents with a sense of uniqueness that is fundamental to the right to human dignity, optimal development, freedom of expression, participation and privacy." From this General Comment section (2016), it is evident that children's participation is important in recreational sports activities, from the very choice of activity/sport to the realization and method of implementation. How the child will choose an activity, how informed it is on the particularities of a particular activity/sport, the way of training and the dynamics of training - these are all segments that make up the complete growth and development of an individual. Participation is not only inclusion for authors branch participation into different types, steps, ladders. There are three ways of implementing the participation of children according to Lansdown (2010): consultative, in which adults seek the opinion of children, collaborative, which implies active engagement in various phases of a specific activity and participation initiated by children, where the adult is neutral, only helping and directing cooperation. According to Hart (1992), the ladder of children's participation consists of eight steps, the first step represents the manipulation of children and the highest eighth step represents participation initiated by children.

1.2   Sport and children

In 2022, the European Commission published the fifth Eurobarometer dedicated to sports and physical activity. It shows that 38% of Europeans do sports or exercise at least once a week or more, 17% of Europeans exercise less than once a week, and even up to 45% of Europeans currently never exercise or participate in any physical activity. (European Commission, 2022). The European Commission emphasizes that the results are stable compared to those of the previous year 2017. However, it is an indisputable fact that the promotion of sports and physical activity in general is still very much needed.

In today's society, when technology has occupied everyone, especially the youngest, it is refreshing to hear that someone is involved in sports. Some children start training from an early age, some when starting school and coordinating with their school obligations, some later to take care of their health. It is impossible to state all the reasons without some more comprehensive study, but the fact is that sports is recognized as a kind of *tool* for the improvement of physical health, but also for the advancement of capacities and skills. Sports is a *widespread and popular social phenomenon, the integral part of the culture of modern society* (Croatian Encyclopedia).

Boys and girls are equally interested in sports, but the motives for choosing sports are often different. According to previous research, sports attract students for different reasons: fun, games, a good coach and the influence of peers (Martinović, 2014). Allender et al. (2006) indicate in their research that social interactions, satisfaction, parental support and a safe environment are the most common reasons for participation in sports and physical activities and divide them according to the age of the respondents. Students refuse sports because of parental pressure, frequent injuries, lack of progress, ridicule and/or bullying. Parental pressure is one of the main motives of the present work. According to Hellstedt (1987), the degrees of parental involvement in their children's sports activities differ: on the one hand, there are over-involved parents, in the middle, moderately involved parents, and on the other hand, under-involved parents. Quite often, it is the overly involved parents who demand that their children start playing a certain sport. O'Sullivan (2013) emphasizes that those adults who supervise the sport have a huge influence on the child who plays the same sport. Used in a correct manner, that influence can bring exceptional benefit to the child. The best way to encourage a child to play sports is by personal example. Active parents make their children more active so that they themselves start playing sports (Kalish, 2000; Downward et al., 2014).

When it comes to students being informed about the sport they want to play, they most often get information from the presentation of clubs at school, by word of mouth among their peers, through the media, parents are informed about sports or similar. After the child starts training, it is important to be informed about his progress by the coach (Sindik, 2008) for the child to really improve his abilities and skills in sports. Sports activities should be available to every child, preferably in a closer location (Croatian Olympic Committee). At whatever age children start playing sports, it is important that the sport adapts to them, just as much as they

M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students' Involvement in the Decision Process About Sports Activities

533

need to adapt to the sport. A child should have a positive experience at every training session, every game or performance.

Children's rights are also important in sports, they should feel safe and accepted, learn from mistakes, learn new things. Children should choose the sport they want to play.

2 Method

2.1 Objective

The aim of this work is to determine the appearance of children's participation models in choosing sports with the purpose of creating guidelines for increasing the active participation of students and indirectly influencing their mental and physical health. Information on the intensity, dynamics and advantages of sports for students is also indicated.

Four research questions were selected from the set research objective:

1. What direction of attitudes do students express towards the choice of sport in general?
2. How involved students are in choosing the desired sport?
3. Are students informed about the intensity, dynamics and benefits that sport has for them?
4. Are there differences among students in active participation for their inclusion in the desired sport (gender)?

Based on the research questions, the research hypotheses were set:

1. Students express a positive direction of attitudes related to playing sports.
2. Participation in the choice of the desired sport is visible among the research participants.
3. Students are informed on the intensity, dynamics and advantages that sport has for them.
4. There are differences in active participation for inclusion in the desired sport with regard to student gender.

2.2   Sample

The survey respondents were 7th and 8th grade students of two elementary schools and the approval of parents/guardians was collected prior to fulfilling the survey. 7th and 8th grade students were chosen according to Côtè's (1999; Côtè and Hay, 2002) model of athlete phase development in which the specialization stage, in which skills and performance improve with increased dedication to the sport, occurs between approximately 13 and 15 years of age. The sample was appropriate. A total of 107 students, 69 male and female 7h grade students and 38 male and female 8th grade students completed the survey. Their right to withdraw at any time and permission not to answer certain questions from the questionnaire was clearly emphasized. The principles of harmlessness, usefulness and, above all, confidentiality and anonymity were emphasized to the respondents of the research. As respondents in this research, students who play and do not play sports participated, regardless of the category of selective (top sport according to strictly defined criteria for athletes) or non-selective sport (sport for everyone) (Milanović, 2013).

2.3   Instrument and procedure

The research instrument for the set goal was a survey. The survey consisted of six questions. The first two questions were directed towards the structure of the samples (student gender and age). The third question offered a choice of whether the students played sports. The fourth question provided a deeper insight into the students' attitude towards playing sports, where a Likert-type assessment scale was used and classmates could choose on a scale from 1 to 5 (no sense at all, small, moderate, high, exceptionally high sense in playing sport). The fifth question had a single choice of seven offered answers for the question of whose decision it was to choose the sport that the student played (*my parents registered me in a sports activity without any question; my parents persuaded me to start practicing this sport because they themselves had been involved in it; prior to making the decision to start training, I spoke with my parents and we made a decision together ; my parents initiated me to start training a certain sport, I chose the sport; I started training this sport because of my friends; the idea and decision were exclusively my own; other*). The last question offers multiple choice answers related to the information the students were familiar with before starting the sport training (*how many times a week do I train; how often do I have matches/performances; what the workouts look like; why that sport*

*M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students'
Involvement in the Decision Process About Sports Activities*

535

is good for me; what does sport bring me in the context of health; other) The last choice in the fifth and sixth questions was open-ended, which allowed the participants to express themselves freely and add to it in order to gain a deeper insight into the subject of the research. The data was collected through a student survey, and a degree of anonymity and privacy was ensured during the research.

2.4   Data analysis

Descriptive parameters were used for the first, second and third research questions. The results are shown in frequencies and percentages and some are additionally shown graphically for better clarity. For the last research question, a Chi-square test was conducted to check whether there were statistically significant differences in active participation for inclusion in the desired sport with regard to the gender of the student. The collected data were processed with statistical program SPSS 20.0.

3   Results

There are a total of 107 male and female 7th and 8th grade students from two elementary schools in this sample as respondents of the research. 51 of the 107 students were boys (47.7% of respondents), while 56 were girls (52.3% of respondents) (Table 1). Regarding the percentage, there is no visible greater willingness to participate in the trial by one or the other group.

Table 1: Pupil's gender

		Frequency	Percent
	Boys	51	47,7%
Gender	Girls	56	52,3%
	Total	107	100%

Due to the mentioned reason, 7th and 8th grade students were chosen from two elementary schools. The total was 69 female and male 7th grade students (64.5% of respondents) and 38 female and male 8th grade students (35.5% of respondents (Table 2).

Table 2: Age/Grade

		Frequency	Percent
Grade	**7th grade**	69	64,5%
	8th grade	38	35,5%
	Total	107	100%

Out of the total number of students, it is important to point out that a total of 85 respondents played sports (79.4%). This data is an excellent indicator that students are still aware of the benefits of sports because they choose them and engage in them (Graph 1). This result is an optimistic indicator that students are not only focused on screens, but also care about their physical health.
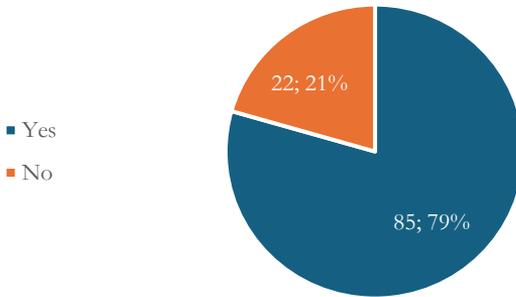
Graph 1: Students who play sport

The search for an answer to the first research question is focused on the expression of student attitudes related to the choice of sport. In the survey, students answered to the question whether they saw any sense in playing sports whereby they could choose on a scale from 1 to 5 (no sense at all, small, moderate, high, exceptionally high sense in playing sport). In this question, the answers were not separated according to the already known information about who practiced sports and who did not, precisely because of the fact that the general attitude of all students who participated in the research was to be examined. According to the acquired results (Table 3), 92 students (85.9%) showed that they saw great or extremely great meaning in playing sports. It would be interesting to investigate the reasons why they chose exactly those answers. That question would certainly provide better insight for further and deeper research. However, in this research, such a question that

M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students' Involvement in the Decision Process About Sports Activities

537

would have detailed the answer was deliberately skipped, given that the goal of the research did not go in that direction.

Table 3: Do the students saw any sense in playing sports

		Frequency	Percentage
Point in doing	None = 1	3	2.8%
	Small = 2	1	0.9%
	Moderate = 3	11	10.3%
	High =4	40	37.4%
	Exceptionally high = 5	52	48.6%
	Total	107	100%

Furthermore, the data of students who stated that they practiced a certain sport were used for the second, third and fourth research questions. Further questions in the questionnaire were not mandatory for students who did not train, but some of them filled out the questionnaire to the end anyway. Not having an answer to why these students answered questions that did not apply to them, these data are not presented in this paper. As for the students who did train, when asked whose decision it was for the students to play that particular sport, the students chose one of the six answers offered, or they could add an answer that they considered missing among the ones offered. The results from Table 4 showed how for 32 students the idea of playing sports and the decision on training sports was of their own making (37.6%), 28 of students made the decision in agreement with their parents (32.9%), 17 of students were encouraged by their parents but the sport was of their own choosing (20%), 4 of students played sport due to the influence of their friends (4.7%), 2 of students played sport because their parents had played the same sport (2.4%), the same as the student who chose and wrote a similar answer under the other option (because it is a family member) – training because of their sister (1.2%), while one student's parents had enrolled him in sports without any question or agreement beforehand (1.2%).

From the answers received, it can be concluded that students showed a high degree of autonomy when choosing the desired sport they play, whether it was their choice explicitly or in cooperation and agreement with their parents. (70.5%). However, as pedagogues, we do not remain indifferent to the answers of students who state that their parents enrolled them in sports without any questions or only because of the

fact that their parents or friends were/are engaged in that sport. However, the fact that more sub-questions here might further clarify these student answers should also be taken into account.

Table 4: Whose decision was it to choose the sport they play

		Frequency	Percent
Decision to choose the sport they play	My parents enrolled me in a sports activity without any questions	1	1,2%
	My parents persuaded me to start training this sport because they played this sport before	2	2,4%
	Before making the decision to start training, I spoke with my parents and we made a decision together	28	32,9%
	My parents initiated me to start training a certain sport, but I chose the sport	17	20,0%
	I started training this sport because of my friends	4	4,7%
	The idea and decision were exclusively mine	32	37,6%
	Other	1	1,2%
	Total	85	100,0%

Answers that are partially in favor of the students' autonomy and participation also show the answers to the question about what information the students encountered before starting sports training. To this question, they could choose more than one answer from those offered, and they could also add some information that was not listed. The results from Table 5 show how students are informed on determined information before starting training. Only one of 7 students (8.2% of students) answered that they did not know any information before training (written under the option other), while the remaining 6 repeated some information they could choose from the offered answers. Although the students chose the offered answers, only 8 students (9.4% of the entire number of students) stated that they were familiar with the information offered as possible answers.

Table 5: Information frequency

		Frequency	Percent
What information were they familiar with[a]	how many times a week do they train	69	81,1%
	how often they have matches/performances	29	34,1%
	what the training looks like	55	64,7%
	why that sport is good for them	49	57,6%
	what are the benefits of that sport for their health	44	57,7%
	other	7	8,2%

M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students' Involvement in the Decision Process About Sports Activities

539

The fourth research question is aimed at determining the differences in active participation for inclusion in the desired sport with regard to the gender of the student (Table 6). Among the male and female students who stated that they played sports (85 students), it was determined how many of them, when asked whose decision it was to participate in a particular sport, answered that the idea and decision about sports was of their own making. The remaining answers to the decision resolution in this question were ignored because no other answer showed the full participation of the child.

Table 6: Participation for inclusion in the desired sport

Gender	N	Students who chose their sport	Percent
Boys	46	18	39,13%
Girls	39	14	35,89%

According to the obtained values from Table 6, a Chi-square test (to determine whether the samples differ in the observed properties) was performed (Table 7). Chi squared test equals $\chi2= 0.203 < 3.84$ (p = 0.05), which means that there are NO statistically significant differences in active participation for inclusion in the desired sport between boys and girls.

Table 7: Chi-square test results

Chi-square test	Students who chose their sport Observed (expected) frequencies	Students who did NOT choose their sport Observed (expected) frequencies	Total:	Chi-square test results χ^2:
Boys	**18** (17)	**28** (29)	46	**0.203**
Girls	**14** (15)	**25** (24)	39	
Total:	32	53	85	

4   Discussion

In the empirical part of the paper, the first hypothesis (h1) is accepted because a positive direction of attitudes is visible, i.e. students express a positive direction of attitudes related to playing sports. This is supported by the fact that out of 107 students surveyed, 85 of them played sports (79.4% of respondents). There is no significant difference in playing sports between male and female students (there are 46 male and 39 female students who play sports). However, regardless of the

accepted hypothesis, space for improvement is visible in the methodology part in which more precise data could be looked for.

The same argument is suitable for the second hypothesis (h2) that participation in the choice of the desired sport is visible among the research participants. The hypothesis is partially accepted because, although students showed a high degree of autonomy in choosing the desired sport they played, either explicitly by their choice or in cooperation and agreement with their parents (70.5%), more detailed qualitative answers in, for example, a focus group, would have provided a deeper insight into their answers. Nevertheless, the promising percentage of more than 70% certainly raises pedagogical hope in the context of children's participation in sports, but at the same time it also raises pedagogical concern for those students who stated that their parents had enrolled them in sports without any questions or just because of the fact that their parents or friends were/are engaged in that sport. The fact that the majority of students will give up sports under pressure from their parents/teachers/coaches/… is enough of an alarm that children's participation in its highest degree should be seriously considered in this area as well.

The third hypothesis (h3) was how students are informed about the intensity, dynamics and benefits that sport has for them. This hypothesis is rejected. Although the students chose for answers the information they encountered before training (how many times a week the trainings take place, what do the trainings look like, what does sport mean for their health), only one student was familiar with all the information that assumed the intensity, dynamics and advantages. The aspiration is for students to have a wide range of information before engaging in an activity, rather than being partially informed. Being well informed presupposes high-quality in children's participation.

The fourth hypothesis (h4), which assumes the existence of differences in active participation for inclusion in the desired sport with regard to the gender of the student, is rejected. The implementation of the Chi-square test proved that there is no significant difference in the above.

M. Sesar, B. Horvat Petravić, V. Valjan Vukić: Students' Participation in Sport - Students'
Involvement in the Decision Process About Sports Activities

541

5 Conclusion

After a detailed analysis, the need for further qualitative methodology is indicated in order to enrich the overall research, and also to obtain the full context of student responses. Besides the aforementioned limitation of the research, it is also important to mention the age and number of respondents and the possible giving of socially desirable answers. This research is certainly subject to further expansion, especially when analyzing the individual components of the Experimental Program *Elementary school as a full-day school* (Ministry of Education, 2023) in which one of the highlights of the program will be the sports field. The task of the education system is to develop skills, abilities and knowledge for life and work, to promote global and lifelong learning, to empower people to use the latest technologies and to raise awareness on the importance of physical and mental health, without neglecting the right to decide and choose, and the participation of children in choosing activities.

In addition to acknowledging the limitations of the research, it is crucial to underscore the significant scientific contribution it offers. Student participation in sports, especially through involvement in the decision-making process on sports activities, is one of the fundamental pillars in the design of comprehensive education. By participating in sports activities, students not only take care of their physical health, but also acquire invaluable experiences that enrich their character and develop key skills needed to successfully face the challenges of life. Moreover, by advocating for a democratic approach to decision-making in sports activities, this paper emphasizes the importance of empowering students and fostering a sense of belonging and significance within their communities because, as Korczak points out (2002, 191): "There are no insignificant symptoms. You have to record everything and think about everyone, reject what is random, explore what is close, look for the laws that govern." This understanding of the connection between student participation in sports and broader societal values serves as a cornerstone for shaping future educational reforms and guidelines. Through dialogue, cooperation and recognition of individual needs, sport promotes diversity and acceptance among students. Ultimately, this paper underscore the transformative potential of student participation in sports in shaping not only individual lives but also the collective fabric of society, thereby laying a solid foundation for future educational endeavors.

References

Allender S, Cowburn G. & Foster C. (2006). Understanding participation in sport and physical activity among children and adults: a review of qualitative studies. *Health Education Research*, *21(6),* 826–835. doi: 10.1093/her/cyl063

Côtè, J. (1999). The influence of the family in the development of talent in sport. *The Sport Psychologist, 13*, 395–417. doi: 10.1123/tsp.13.4.395

Côtè, J. & Hay, J. (2002). Children's involvement in sport: A developmental perspective. In J. M. Silva & D. E. Stevens (Eds.), *Psychological foundations of sport* (pp. 484–502). Allyn and Bacon.

Dewey, J. (1916). *Democracy and Education*. The Macmillan Company. https://archive.org/details

Downward, P., Hallmann, K. & Pawlowski, T. (2014). Assessing parental impact on the sports participation of children: A socio-economic analysis of the UK. *European Journal of Sport Science, 14(1)*, 84–90. https://doi.org/10.1080/17461391.2013.805250

European Commission (2022). New Eurobarometer on sport and physical activity shows that 55% of Europeans exercise. *In European Commission.* Retrieved December 11, 2023, from https://ec.europa.eu/commission/presscorner/detail/en/ip_22_5573

Hart, R. (1992). *Children's Participation: from Tokenism to Citizenship*. UNICEF.

Hellstedt, J.C. (1987). The coach/parent/athlete relationships. *Sports Psychologist, 1(2)*, 151– 60. doi: 10.1123/tsp.1.2.151

Hrvatska enciklopedija (n.d.). Sport. In *Hrvatska enciklopedija*. Retrieved December 12, 2023, from https://www.enciklopedija.hr/Natuknica.aspx?ID=59859

Hrvatski olimpijski odbor. Razvoj sporta specifičan za određenu lokalnu sredinu. *In HOO*. Retrieved December 11, 2023, from https://www.hoo.hr/page/656

Kalish, S. (2000). *Fitness za djecu – praktični savjeti za roditelje*. Gopal.

Konvencija o pravima djeteta (1989). Konvencija o pravima djeteta. *In Unicef.* Retrieved December 9, from https://www.unicef.hr/wp-content/uploads/2017/05/Konvencija_20o_20pravima_20djeteta_full.pdf

Korczak, J. (2002). *Dobri duh čovječanstva*. Educa.

Kosi, D. (2020). Škola Summerhill. *Varaždinski učitelj : digitalni stručni časopis za odgoj i obrazovanje, 3(4)*, 258–265. https://hrcak.srce.hr/242197

Lansdown, G. (2001). *Promoting children`s participation in democratic decisionmaking*. UNICEF. https://www.unicef-irc.org/publications/pdf/insight6.pdf

Martinović, N. (2014). *Zdravstveni vodič za mlade sportaše*. Udruga zdravstvenih djelatnika u športu.

Milanović D. (2013). *Teorija treninga: Kineziologija sporta*. Kineziološki fakultet Sveučilišta u Zagrebu.

Montessori, M. (1952). *Kinder sind anders*. Klett-Cotta.

Ministarstvo znanosti i obrazovanja (2023). Eksperimentalni program. *In MZO*. Retrieved January 3, from https://mzo.gov.hr/UserDocsImages/dokumenti/Obrazovanje/OsnovneSkole/Cjelodnevna-skola/Eksperimentalni-program-Osnovna-skola-kao-cjelodnevna-skola.pdf

Neill, A. S. (1999). *Škola Summerhill: novi pogled na djetinjstvo*. Biblioteka Pitija.

Opći komentar br. 20 o provedbi prava djeteta tijekom adolescencije (2016). Opći komentari odbora za prava djeteta UN-a. *In Konvencija o pravima djeteta*. Retrieved December 11, from https://dijete.hr/hr/dokumenti/medunarodni-dokumenti/opci-komentari-odbora-za-prava-djeteta-un-a

Philipps, S. (1999). *Montessori priprema za život : odgoj neovisnosti i odgovornosti*. Naklada Slap.

Seitz, M. & Hallwachs, U. (1996). *Montessori ili Waldorf?*. EDUCA.

Sindik, J. (2008). *Sport za svako dijete: kako odabrati pravi sport, brinuti se o zdravlju i osigurati pozitivno iskustvo od samog početka*. Ostvarenje. https://www.izvorznanja.com/teaser//340.pdf

O' Sullivan, J. (2013). *Changing the Game. The Parent guide to Raising Happy, High – Performing Athletes and Giving Youth Sports Back to Our Kids*. Morgan James Publishing.

ARTS IN EDUCATION
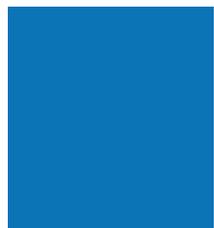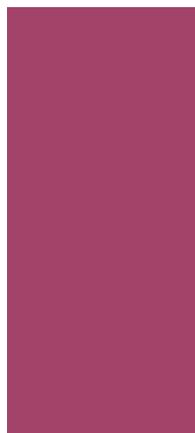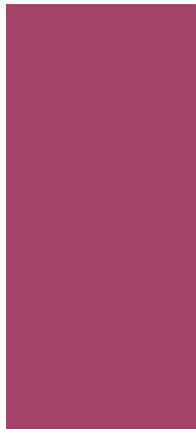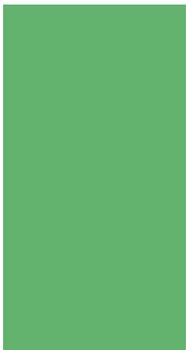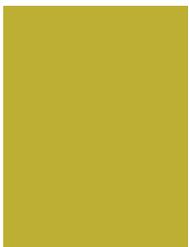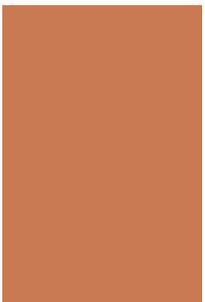
Generative Artificial Intelligence and Prompting: Utilizing Existing Artworks for Educational Purposes

Marina Đira

University of Zadar, Department of Teachers and Preschool Teachers Education, Zadar, Croatia
mdira@unizd.hr

This paper explores Generative Artificial Intelligence (GAI), whose popularity among users has notably increased with the emergence of the user-friendly chatbot ChatGPT-3.5 intended for generating text in late 2022. The paper first briefly discusses the previous research related to GAI, especially its implementation in the educational context, after which the focus is shifted on the characteristics of GAI models for generating images, and the specifics related to providing textual instructions to such tools for the purpose of generating visual content. Such prompting is compared with some examples of textual descriptions of images that existed before Web 3.0 (certificates of Sol LeWitt, art-educational method of observation and the analysis following a description of an artwork, ekphrasis). Additionally, the work engages in simple qualitative research on some of the possibilities of applying such GAI models in an educational context through examples of prompting, inspired by one figurative and one abstract painting.

University of Maribor Press

Generativna umetna inteligenca in pisanje pozivov: uporaba obstoječih umetniških del za uporabo v vzgojno-izobraževalnem kontekstu

Marina Đira

Univerza v Zadru, Oddelek za izobraževanje učiteljev in vzgojiteljev, Zadar, Hrvaška
mdira@unizd.hr

Ta naloga se ukvarja z generativno umetno inteligenco (GAI), katere priljubljenost med uporabniki je posebej narasla z pojavom uporabnikom prijaznega klepetalnega robota ChatGPT-3.5 za generiranje besedila ob koncu leta 2022. Uvodoma se posvetimo kratkemu pregledu obstoječih raziskav na področju GAI, predvsem tistih, ki obravnavajo uporabo GAI v vzgojno-izobraževalnem okolju. Pozornost se nato usmerja na značilnosti GAI modelov za generiranje slik in specifičnosti, ki so povezane z izdajanjem tekstualnih navodil za orodja za generiranje vizualnih vsebin. Takšen *prompting* se primerja z nekaterimi primeri tekstualnih opisov slik, ki so obstajale pred različico Web 3.0 (certifikati Sola LeWitta, likovno-pedagoška metoda opazovanja in analiziranja na podlagi predhodnega opisa umetniškega dela, ekfraza) in se izvaja preprosta kvalitativna raziskava, v kateri se na primeru *promptinga*, spodbujenega z eno figurativno in eno abstraktno sliko, raziskujejo nekatere možnosti uporabe takih GAI modelov v vzgojno-izobraževalnem kontekstu.

1   Introduction

The field of artificial intelligence (AI) has experienced highs and lows over the past seven decades, dubbed by Toosi et al. (2021) as its "summers" and "winters". They particularly highlight the 1940s and 1950s as an intriguing period marked by significant artistic ideas (Isaac Asimov's "I, Robot") and scientific achievements (studies by Alan Turing). These prehistoric events, as they date them, preceded the actual articulation of the concept, which was coined in 1956, marking the beginning of the first summer of AI. From then until 2021, they outline the unfolding of decades and their interest in intelligent machines, ultimately heralding their promising future. This future did indeed unfold, as AI has experienced a surge in popularity in recent years, with the field of Generative Artificial Intelligence (GAI) particularly experiencing significant growth (García-Peñalvo & Vázquez-Ingelmo, in press).

Regarding said expression, García-Peñalvo and Vázquez-Ingelmo (in press) caution that not every AI capable of generating something automatically qualifies as GAI. GAI refers to models capable of producing new, previously unseen information based on the data on which they were trained. The content they generate is not just numerical and tied to internal rules but resembles content created by humans and can be further utilized. This often makes it challenging to distinguish between creations of GAI models and human creations, which is why Feuerriegel et al. (2023) attribute to it the potential for transforming fields and industries relying on creativity, innovation, and knowledge processing. The outlines of these predictions are likely anchored in the events of 2023, which was characterized by the widespread experimentation with ChatGPT, a highly accessible text-generating chatbot, whose 3.5 version was introduced by OpenAI in November 2022 (Jauhiainen & Guerra, 2023).

Interestingly, the revolution was instigated by ChatGPT-3.5 which serves as a text generator, as opposed to image-generating models that already existed at the time, such as OpenAI's DALL-E and *Midjourney*, as noted by García-Peñalvo (2023). Nevertheless, the capabilities of ChatGPT, quickly recognized by users (exceeding over a hundred million active users by January 2023 (Hu, 2023)), evidently popularized other types of tools that soon began emerging on a weekly basis, providing users with endless possibilities for generating text, images, music, etc., in

a straightforward manner, provided the user has internet access and possesses a computer or smartphone (Jauhiainen & Guerra, 2023).

Considering that the users tend to be children and young people in great part, it is to be assumed (and is already happening) that GAI will impact formal education systems, thus making it a topic of numerous research studies. Its advantages, as outlined by Jauhiainen and Guerra (2023), include accessibility and user-friendliness, rendering it adaptable for implementation in this domain and for integration with other educational innovations, such as digitization and gamification. Focusing on higher education in their work, Chan and Wenjie (2023) highlight several of its merits. While they view text-generating tools as tangible aids in writing papers and evaluating written work, supported by an extensive array of references, they briefly touch on GAI image generators, considering them valuable tools for developing skills in the fields of art and design. This current emphasis on text generators in research related to the educational context has also been noted by Lee et al. (2023), who wrote that, in comparison, image generators tend to be relatively underutilized despite their advantages, especially when considered in the context of STEAM.

Of course, the implementation of GAI in educational systems, whether involving text generators, image generators, or other content, should not be hasty. Aside from the advantages, there are also significant drawbacks. That's why Relmasira et al. (2023) emphasized the need to develop AI literacy. In their work, they considered two descriptions of such literacy found in papers published in recent years, highlighting Touretzky et al.'s (2019) characterization. According to them, AI literacy encompasses not only understanding basic AI concepts and the ability to interact with AI technologies but also awareness of AI's impacts on society. In the case of GAI, this impact is directly related to its functioning, as it depends on the quality of the data on which its models are trained, as discussed by Feuerriegel et al. (2023). According to them, the problems associated with GAI are as follows: incorrect outputs, issues related to bias and fairness, and copyright violations. They also added environmental concerns as an important point due to such systems consuming large amounts of electrical energy. Cress and Kimmerle (2023) in their research on ChatGPT highlighted that GAI currently lacks any conceptual knowledge. This has been further demonstrated by Daher et al.'s (2023) study, also related to ChatGPT, in which they concluded that the limitations of this tool became more apparent when

"a high level of depth and critical thinking" is demanded from it (Conclusions, para. 6).

The enumerated deficiencies exert an impact on users in a way that, during interactions with GAI, they try to adapt to its characteristics. This is reflected in an increased focus on prompts, prompting, and prompt engineering. Prompts are simple textual instructions that users provide to its models (or the tools relying on its models) in natural language to generate desired content. The process of giving such instructions could be described as prompting. Since prompting doesn't always result in the generation of desired outcomes, users are led to continuously modify prompts to approach the desired results. This form of GAI interaction, essentially grounded in a trial-and-error paradigm, has catalysed the evolution of prompt engineering. Concerning text generation models, Giray (2023) delineates prompt engineering as a nascent discipline intricately connected with the refinement and optimization of prompts to enhance the efficacy of large language models (LLMs), such as GPT. This is particularly pertinent when composing instructions in natural language, the input for these prompts. When it comes to image generation models, the situation is quite complex because prompt engineering in this context needs to consider the transition from text as one medium to an image as another. Feng et al. (2023) describe it as an iterative activity where users experiment with diverse linguistic expressions to achieve their desired outcomes, a task that may demand a substantial temporal investment.

Given that the formulation of prompts has emerged as a pivotal competency in the interaction with GAI, as underscored by Lee et al. (2023), it is imperative to accord it due consideration. Within the realm of the arts, encompassing not only visual arts but also art pedagogy and literature, prompt engineering assumes notable significance as it affords opportunities for integrating GAI with certain artistic forms and methodologies that predate the advent of Web 3.0. As for visual arts, it is sufficient to mention the eminent conceptual artist of the 20th century, Sol LeWitt, who was renowned for his instructions, conveyed textually and occasionally delineated in the form of succinct sketches, which serve as instructions for the execution of wall drawings by others. His instructions are composed of visual-formal descriptions, often including descriptions of art materials, as is the case with his Wall Drawing #786A from 1995, which is presented in the form of a certificate, another one of his peculiarities, in the work of Kohen and Theodore (2013):

"(…) A 36° (90 cm) grid covering the wall. All two-part combinations of arcs from corners to sides. Black pencil grid, white crayon lines, black wall (…)." (p. 105)

In light of its structural resemblance to many of his other directives, such instructions can easily be perceived as stimuli for the recreation of the wall drawings to which they pertain. It is noteworthy that GAI enthusiasts have identified these instructions as prompts, as extensively documented on the internet (see Goodchild, 2023; Woo, 2022). However, it is essential to underscore that prior to GAI enthusiasts, art teachers and museum educators had already embraced said instructions. They often incorporate LeWitt's certificates into their artistic activities with children and youth, irrespective of the capabilities of GAI. This is evident from numerous accounts of classroom sessions and museum pedagogical activities available online (see Gaw, 2016; Kunstmuseum Basel, 2020).

In the realm of art education, an intriguing method occasionally employed in schools is described by Petrač (2015) as the method of observation and analysis following a prior description of an artwork. This method, akin to *analogical prompting* from a GAI perspective, involves a teacher or student verbally describing an image, while others are tasked with imagining and subsequently creating their own visual works based on that description. The surprise effect is anticipated when the described image is revealed. Having successfully employed this method multiple times in my own teaching practice with elementary school students and university students in teacher education and witnessing its utilization by students under my mentorship in their research endeavours (for example, see Vrkić, 2023), I feel confident in asserting that this method is intriguing not only due to the aforementioned surprise element but also for various other reasons.

In such a structured activity, students tasked with describing an artwork are encouraged to articulate in detail what they observe in the image. Those engaged in creating their own visual works based on the description are prompted to visualize the spoken or written description in a rich and detailed manner. Simultaneously, all participants in such an activity are directed toward composition as the fundamental structure of the image. Here, the primary reference is to basic categories such as orientation (vertical, horizontal, diagonal), relationships on the plane (centre, left, right, up, down), in space (in front of, behind, within, outside), and proportional relationships (smaller, larger, equal). These mentioned landmarks, particularly in the

context of primary education, align with essential curriculum outcomes across various school subjects in Croatia (*Kurikulum za nastavni predmet Likovne kulture za osnovne škole i Likovne umjetnosti za gimnazije u Republici Hrvatskoj* (LK), 2019; *Kurikulum za nastavni predmet Matematike za osnovne škole i gimnazije u Republici Hrvatskoj*, 2019; *Kurikulum za nastavni predmet Prirode i društva za osnovne škole u Republici Hrvatskoj*, 2019). The same curriculum outcomes are highlighted in this method during the final comparison of students' visual works with the artwork that served as the basis for their creation, emphasizing the significance of these outcomes.

Literature possesses its ancient tools for vivid description, among which ekphrasis stands out. Described under the same heading in the Croatian Encyclopaedia, ekphrasis is characterized as a method of description that, in a broader sense, refers to any discourse aimed at vividly presenting a given topic, while in a narrower sense, it is confined to the description of artistic works and artifacts. One of the early examples of ekphrasis is found in Homer's Iliad, where Tarlton (2015) highlights the description of Achilles' shield, commenting on it as tangible despite being never seen. Nevertheless, as noted subsequently, the objective of ekphrasis is not in providing a perfect verbal depiction of an image; rather, its aim is to offer the reader a specific ekphrastic experience. This concept is elegantly encapsulated in the analysis of two poems by poets of the New York School by Davidson (1983):

"In order to render the instability of this artifact, the poet becomes a reader of the painter's activity of signifying. This act of reading is never passive, never recuperative since its function is to produce a new text, not to re-capture the original in another medium. The poet who reads another work of art transforms his hermeneutic into performance, just as the reader of the poem participates among the various codes of the text to generate his own readings." (p. 77)

Therefore, the transformation occurring in the transition from one medium (image) to another (text) and vice versa is by no means straightforward. With each transition, a portion of the existing elements is reduced, giving rise to new layers. This phenomenon, indeed, transpires even when remaining within the same medium, as every act of reception implies a redefinition. Davidson (1983) discussed the distinctions between what is written by the poet and what is read by the reader; such distinctions are evident between what is painted by the artist and what is perceived by the observer. Drawing upon the power of visual language, Damjanov (1991), for

instance, posited that an observer, when activating a profound level of perception during observation, possesses the ability to both perceive and create through his gaze.

Although not inherently designed for prompting, ekphrasis may align particularly well with GAI, as it allows for an extensive elaboration of motifs, granting GAI the choice of how to structure the composition. In this process, GAI autonomously generates the composition, drawing upon the wealth of data in its training arsenal. The results are generally impressive, as observed in the case of prompting John Keats's famous poem "Ode on a Grecian Urn" (Figure 1), which was initially considered for research in the preparatory phase but ultimately discarded for the very reason that it seemed too predictable for GAI. Unlike such an approach, the instructions of Sol LeWitt and the method of observation and analysis after the prior description of an artwork genuinely demand an analytical behaviour from GAI – not concerning motifs, but rather the visual language that encompasses elements such as lines, colours, shapes, and basic compositional relationships. Regarding Sol LeWitt's instructions, in the artist's blogs and similar sources, their prompting has ventured into uncharted territories, making them suitable for further experimentation. The subsequent research is dedicated to exploring this alternative method, well-known in art education.
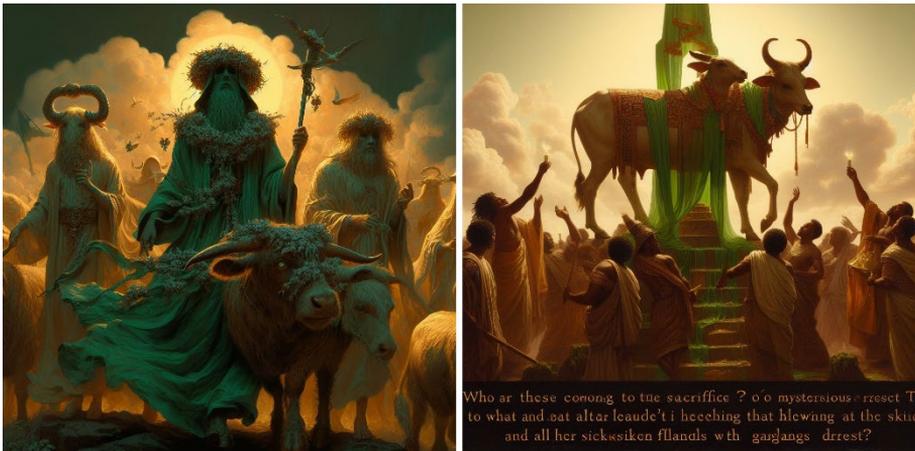

Figure 1. Two out of four images generated from the same prompt (*Who are these coming to the sacrifice? To what green altar, O mysterious priest, Lead'st thou that heifer lowing at the skies, And all her silken flanks with garlands drest?*) using AI (in *Bing Image Creator*) on November 20, 2023, at 10:10 a.m.

The prompt is taken from John Keats's poem "Ode on a Grecian Urn" from 1819, specifically from one part of the poem (4th stanza, 1st to 4th lines), retrieved from Wikipedia ("Ode on a Grecian Urn," 2023), with minimal modifications (spacing). From the generated images, it is evident that the motifs are recognized, with GAI arranging them according to its preferences, likely aiming to achieve a strong visual impression. The symmetrical composition is a conservative choice that consistently results in a balanced composition, and the psychologically impactful complementary colour contrast, ranging from blue to green on one side and from orange to red on the other, is also utilized. Hollywood often employs this contrast as a template, notably in films by Michael Bay, but Arnheim (1969) wrote about this contrast long before, drawing on observations made even earlier, by Goethe. Regarding the generated image shown on the right, another aspect is noticeable: the need for visual formatting of the text, creating an overall presentation akin to a form of illustration. It can be assumed (but only as a hypothesis) that this occurs when GAI recognizes in the prompt a refined language that is itself an art form, treating it as an image.

2 Description and Aim of the Research

The research uses simple descriptions of selected artworks (one figurative and one abstract painting) as default prompts for selected GAI image generation tools. These descriptions in the research are shaped in such a way that they resemble the answers that are usually obtained in teaching practice to the initial question *What do you see?* when observing a work of art. The same method of description is used in the method of observation and analysis after the previous description of the work of art.

The goals are to explore the possibilities of accessible GAI tools when it comes to generating existing images and, based on that, to propose some possibilities of using such prompting in an educational context.

Research Questions

1. Do the generated images contain the elements given in the prompts?
2. Do the generated images reflect the relationships described in the prompts?
3. Are there significant differences related to the first two questions, regarding prompting descriptions of figurative and abstract paintings?

4. Roughly, how much time during the research was devoted to adjusting the prompts in order to obtain the best possible results?
5. In what way could GAI prompting of existing images be used in an educational context?

2.1 Method

As a qualitative study, the intention of the research was to explore the described topic in terms of its application in the educational context, aligning with the typical practices of teachers who, to varying extents, engage in such exploration when crafting lesson plans. In line with this, I, the teacher, am the sole participant in this research, essentially reflecting my lesson preparation related to considering the introduction of GAI as new educational content. Formally speaking, the research includes:

1. Selection of suitable GAI tools and artworks for image generation.
2. Description of the prompting process.
3. Presentation and interpretation of the results.

2.2 Selection of Suitable GAI Tools and Artworks for Image Generation

While the internet offers a variety of tools for image generation, in the preparatory phase of the research, only two such tools were ultimately chosen from the initially selected five (*Bing Image Creator*, Canva's *Magic Media*, *Gencraft*, *Craiyon*, *Runway*) for experimentation. The selected tools are *Bing Image Creator* by Microsoft, which currently relies on OpenAI's DALL-E 3 model, and *Runway*, a tool from the company of the same name, whose researcher Patrick Esser participated in the implementation of *Stable Diffusion* (Jennings, 2022), a different GAI model for image generation often mentioned alongside DALL-E and *Midjourney*. Both tools are available for use on the internet, have limited but quite usable free versions, and can be utilized on both computers and smartphones. Additionally, in their terms of use, which are quite complex for both tools and should be thoroughly read, it is essentially stated that Microsoft and Runway AI do not claim ownership rights over prompts and generated images. However, users also cannot protect them through copyright (Bing Image Creator, August 4, 2023; Runway, September 5, 2023).

For the research, two well-known paintings were selected—one figurative, *Woman with a Parasol - Madame Monet and Her Son* (1875) by Claude Monet, housed in the National Gallery of Art in Washington (n.d.), and one abstract, *Composition with Yellow, Blue, Black and Light Blue* (1924) by Piet Mondrian, located in the Yale University Art Gallery (n.d.). These paintings were chosen for the formulation of prompts and subsequent generation of new images for several reasons. First and foremost, content-wise, most people have a relatively clear conception of both, or at least recognizable painting styles associated with Monet (impressionism) and Mondrian (De Stijl, neoplasticism, geometric abstraction). The second reason is that the compositions of both paintings elicit descriptions that inevitably involve the need to describe position, relationships on the plane and in space, proportional relationships, etc. – content found in the curriculum outcomes for various school subjects in Croatia, as previously mentioned in the text. In describing Mondrian's abstract painting there is also a stronger need to express concepts within the categories of visual language, which is an important part of the curriculum outcomes for Art Education (LK, 2019). Regarding copyright, these paintings were selected because both institutions housing them, as indicated in their respective online collections, have labelled them as being in the public domain under the CC0 designation. While not crucial for prompting itself, this information may become relevant if the generated images closely resemble the originals, especially for the presentation of such results.
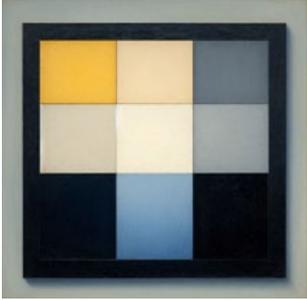
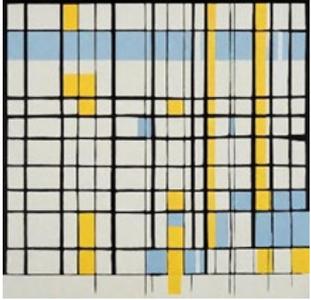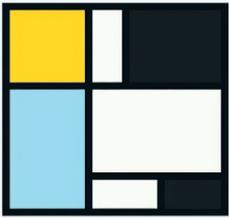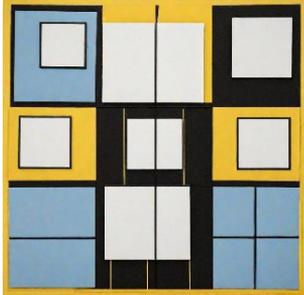## 2.3   Description of the Prompting Process

The prompting process unfolded in two phases. In the first phase, initial prompts were formulated based on selected artworks. They were originally written in Croatian, then translated into English using *Google Translate*, and finally edited using the free version of *Grammarly*. The second phase commenced with the analysis of existing results (prompts and generated images), followed by the modification of prompts. The subsequent presentation of results arguably includes the first outcomes of high-quality (relatively speaking) obtained in this manner during the first and second phases, particularly when viewed in relation to the first two research questions.

2.4 Results and Interpretation

Table 1: Display of results (prompting Monet's painting)

		Bing Image Creator	*Runway*
Phase 1	Prompt	In the middle of the meadow, a woman is shown in semi-profile, from the bottom angle. She is dressed in a light blue long dress. Her hair is only a little bit visible under a small hat. She holds a small opened umbrella in her right hand. In the background on the left is a boy. He is also standing, shown en-face. He is dressed in a sailor's suit and has a straw hat on his head. In the distance is a blue sky with tiny white clouds. It looks windy.	
	Generated image	One of four images generated from the same prompt using AI on November 14, 2023, at 3:13 p.m.	One of four images generated from the same prompt using AI on November 14, 2023, at ca. 3:21 p.m.
	Time	Ca. one hour	
Phase 2	Prompt	A woman stands in the middle of a meadow full of wildflowers. She is shown almost frontally and dressed in a light blue outfit in the style of the second half of the 19th century. In her right hand, she holds an open green umbrella. To her right, a bit further, stands a boy in high grass. He is shown frontally and dressed in a white shirt. He has a hat on his head. The weather is clear, with small white clouds and windy.	
	Generated image	One of four images generated from the same prompt using AI on November 16, 2023, at 4:44 p.m.	One of four images generated from the same prompt using AI on November 16, 2023, at ca. 4:50 p.m.
	Ti	Ca. one hour	

Table 2: Display of results (prompting Mondrian's painting)

		Bing Image Creator	*Runway*
Phase 1	Prompt	The square divided by a vertical black line in its left part and a horizontal black line in its lower part into four fields. The top left rectangual field further divided into a yellow and a white square. The bottom left blue square field. The bottom right rectangual field further divided into a large white and a narrow black rectangle. The top right pale blue field occupies the largest part of the painting, looks like a rectangle that tends to be a square.	
	Generated image	One of four images generated from the same prompt using AI on November 18, 2023, at 8:58 a.m.	One of four images generated from the same prompt using AI on November 18, 2023, at ca. 9:00 a.m.
	Time	For the research, another Mondrian painting was initially chosen (*Lozenge Composition with Yellow, Black, Blue, Red, and Gray* (1921)), which is labeled as CC0 and is part of the online collection of the Art Institute of Chicago (n.d.). The description of the painting was unsuccessfully prompted on multiple occasions over several days. Subsequently, this simpler Mondrian composition was selected as an alternative. The prompting process took less than an hour.	
Phase 2	Prompt	A square divided by black lines into six squares and rectangles. From the top left to the bottom left: a yellow square, a white square, a blue square. From the top right to the bottom right: a large light blue square, a rectangle further divided into a white and a narrow black one.	
	Generated image	One of four images generated from the same prompt using AI on November 18, 2023, at 9:34 a.m.	One of four images generated from the same prompt using AI on November 18, 2023, at ca. 9:36 a.m.
	Ti	Ca. half an hour	

In the prompting initiated by Monet's painting (Table 1), generated images in both phases encompass all elements specified in the prompts. However, in two images, an additional background motif of the woods emerged that was not initially prescribed. Recognizing relationships posed certain difficulties during the prompting process, despite not being evident in the results. In both the first and second phases, challenges often arose concerning the failure to recognize a clear left-right relationship with both tools. However, both tools consistently identified the in-front/behind relationship (center of the image/in the background). The final results from both tools align with the prompts. Concerning the outcomes, attention should be directed to inadvertently written incorrect information in the initial prompt (*sailor's suit, straw hat*), which went unnoticed until the analysis at the beginning of the second phase. Additionally, *Runway*'s recognition of a specific image in the second phase suggests that the *umbrella* in combination with a *light blue outfit in the style of the second half of the 19th century* played a significant role.

Although dealing with a fundamental visual language, prompting inspired by Mondrian (Table 2) proved to be much more challenging (see the *Time* row in Table 2). Nonetheless, both tools generated images containing all elements specified in the prompts. *Runway*, for instance, seemingly recognized them as a pattern for multiplication rather than a finished composition. Regarding relationships, generated images exhibit both vertical and horizontal compositional directions as specified in the prompts. However, there were significant difficulties in left-right and up-down relationships, as evidenced in the results. Finally, it is worth noting that the image generated in *Bing Image Creator* closely approximated the prompt, and throughout the prompting process, this tool demonstrated closer adherence to the prompts it was given.

3   Discussion and Conclusion

Within the scope of this research, and without drawing general conclusions (for (G)AI is designed to continuously learn), it is evident that considerably more challenges emerged in prompting inspired by Mondrian's abstract composition. In this case, the focus was not on referencing figurative motifs but rather on expressing concepts in the categories of visual language. In contrast, prompting inspired by Monet's figurative painting encountered issues only when referring to relationships on the plane (left-right). This is intriguing, particularly considering that problems

with spatial relationships, which are illusory in a two-dimensional representation, did not arise with Monet.

Mondrian proved to be more demanding in a temporal sense, especially considering that his initially chosen painting for the research was abandoned in favour of an alternative. Nevertheless, the extended time spent in prompting his paintings and the overall time invested in the research, from the initial selection of tools onward, can hardly be described as wasted. It is more about the time dedicated to interacting with GAI, which possesses not just one, but as many different ways of thinking as there are models and tools. Accordingly, the possibilities of GAI tools for image generation in this manner, particularly in an educational context, can be immeasurable.

Prompting existing images allows students to see their own mistakes, which are common when superficially perceiving an artwork (especially in the case of figurative paintings), as was the case in this research with Monet's painting. In the case of abstract paintings, such prompting serves to train their expressive potential in relation to the actual visual content of the artwork, not based on motifs but on visual language. Furthermore, such prompting can stimulate a broader discussion about how GAI "thinks", and about the relationship between the training of a particular model and its ability to recognize prompts. In this context, a crucial question that arises is why GAI tools for image generation find it easier to recognize the motif of a woman dressed in the style of the second half of the 19th century with an open umbrella in her hand than a composition of several squares and rectangles arranged on the plane in basic left-right, up-down relationships. When all of the above is integrated, along with the imperative of translation from Croatian to English, and the errors that may arise, thus influencing the final visual results, the prompting described in this study can develop competencies in students that go beyond the ability of visual perception. Finally, the possibilities of GAI for image generation seem to go hand in hand with questions related to copyright and content appropriateness, and pointing out this aspect to students is also potentially very useful.

References

Arnheim, R. (1969). *Art and Visual Perception. A Psychology of the Creative Eye.* Berkeley; Los Angeles: University of California Press.

Art Institute of Chicago. (n.d.). *Lozenge Composition with Yellow, Black, Blue, Red, and Gray.* https://www.artic.edu/artworks/109819/lozenge-composition-with-yellow-black-blue-red-and-gray

Bing Image Creator. (August 4, 2023). *Bing Conversational Experiences and Image Creator Terms.* https://www.bing.com/new/termsofuse?FORM=GENTOS&setlang=en&sid=32C76B672 F6568EC287078A92EBC69AC

Chan, C. K. Y., & Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. *International Journal of Educational Technology in Higher Education*, *20*(1), 43-18. https://doi.org/10.1186/s41239-023-00411-8

Cress, U., & Kimmerle, J. (2023). Co-constructing knowledge with generative AI tools: Reflections from a CSCL perspective. *International Journal of Computer-Supported Collaborative Learning.* Advance online publication. https://doi.org/10.1007/s11412-023-09409-w

Daher, W., Diab, H. & Rayan, A. (2023). Artificial Intelligence Generative Tools and Conceptual Knowledge in Problem Solving in Chemistry. *Information*, *14*(7), Article 409. https://doi.org/10.3390/info14070409

Damjanov, J. (1991). *Vizualni jezik i likovna umjetnost.* Zagreb: Školska knjiga.

Davidson, M. (1983). Ekphrasis and the Postmodern Painter Poem. *The Journal of Aesthetics and Art Criticism*, *42*(1), 69-79. https://doi.org/10.2307/429948

Feng, Y., Wang, X., Wong, K., Wang, S., Lu, Y., Zhu, M., Wang, B. & Chen, W. (2023). PromptMagician: Interactive Prompt Engineering for Text-to-Image Creation. *IEEE Transactions on Visualization and Computer Graphics.* 1-11. https://doi.org/10.1109/TVCG.2023.3327168

Feuerriegel, S., Hartmann, J., Janiesch, C., & Zschech, P. (2023). Generative AI. *Business & Information Systems Engineering.* https://doi.org/10.1007/s12599-023-00834-7

García-Peñalvo, F. (2023). The perception of Artificial Intelligence in educational contexts after the launch of ChatGPT: Disruption or Panic? [La percepción de la Inteligencia Artificial en contextos educativos tras el lanzamiento de ChatGPT: disrupción o pánico]. *Education in the Knowledge Society (EKS)*, 24, Article e31279. https://doi.org/10.14201/eks.31279

García-Peñalvo, F., & Vázquez-Ingelmo, A. (in press). What do we mean by GenAI? A systematic mapping of the evolution, trends, and techniques involved in generative AI. *International Journal of Interactive Multimedia and Artificial Intelligence.*

Gaw, S. (January 29, 2016). Conceptual Art for Kids. *The Art of Understanding. Thoughts about art and education by Samantha Gaw.* https://artofunderstanding.wordpress.com/2016/01/29/conceptual-art-for-kids/

Giray, L. (2023). Prompt engineering with ChatGPT: A guide for academic writers. *Annals of Biomedical Engineering*, *51*(12), 2629-2633. https://doi.org/10.1007/s10439-023-03272-4

Goodchild, A. (April 7, 2023). Midjourney Takes on Sol Lewitt's Wall Drawings. *Amy Goodchild.* https://www.amygoodchild.com/blog/midjourney-sol-lewitt

Hu, K. (2023, February 2). ChatGPT sets record for fastest-growing user base - analyst note. *Reuters.* https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01/

Jauhiainen, J. S., & Guerra, A. G. (2023). Generative AI and ChatGPT in school Children's education: Evidence from a school lesson. *Sustainability* (Basel, Switzerland), *15*(18), Article 14025. https://doi.org/10.3390/su151814025

Jennings, S. (October 5, 2022). The research origins of Stable Diffusion. *Runway Research.* https://research.runwayml.com/

Kohen, K., & Theodore, M. (2013). Interlocutions: Teaching Sol LeWitt's Wall Drawings in the Manner of John Walsh. *Bulletin - Yale University Art Gallery*, 102-107. http://www.jstor.org/stable/23612144

Kunstmuseum Basel. (2020). *My museum – Activity Sheet No. 6: Art Command!* https://kunstmuseumbasel.ch/en/agenda/blog/2020/51

Kurikulum za nastavni predmet Likovne kulture za osnovne škole i Likovne umjetnosti za gimnazije u Republici Hrvatskoj, Narodne novine, 7/2019. https://narodne-novine.nn.hr/clanci/sluzbeni/2019_01_7_162.html

Kurikulum za nastavni predmet Matematike za osnovne škole i gimnazije u Republici Hrvatskoj, Narodne novine, 7/2019. https://narodne-novine.nn.hr/clanci/sluzbeni/2019_01_7_146.html

Kurikulum za nastavni predmet Prirode i društva za osnovne škole u Republici Hrvatskoj. Narodne novine. 7/2019. https://narodne-novine.nn.hr/clanci/sluzbeni/2019_01_7_147.html

Lee, U., Han, A., Lee, J., Lee, E., Kim, J., Kim, H., & Lim, C. (2023). Prompt aloud!: Incorporating image-generative AI into STEAM class with learning analytics using prompt data. *Education and Information Technologies.* https://doi.org/10.1007/s10639-023-12150-4

Leksikografski zavod Miroslav Krleža. (2021). Ekfraza. In *Hrvatska enciklopedija, mrežno izdanje.* Retrieved November 12, 2023, from http://www.enciklopedija.hr/Natuknica.aspx?ID=17305

National Gallery of Art. (n.d.). *Woman with a Parasol - Madame Monet and Her Son, 1875.* https://www.nga.gov/collection/art-object-page.61379.html

Ode on a Grecian Urn. (October 28, 2023). In *Wikipedia.* https://en.wikipedia.org/w/index.php?title=Ode_on_a_Grecian_Urn&oldid=1182246638

Petrač, L. (2015). *Dijete i likovno umjetničko djelo.* Zagreb: Alfa.

Relmasira, S. C., Lai, Y. C., & Donaldson, J. P. (2023). Fostering AI literacy in elementary science, technology, engineering, art, and mathematics (STEAM) education in the age of generative AI. *Sustainability* (Basel, Switzerland), *15*(18), Article 13595. https://doi.org/10.3390/su151813595

Runway. (September 5, 2023). *Terms of Use Agreement.* https://runwayml.com/terms-of-use/

Tarlton, C. D. (2015). Notes for a Theory of Tanka Prose: Ekphrasis and Abstract Art. *Atlas Poetica: A Journal of World Tanka*, 23, 87-95.

Toosi, A., Bottino, A., Saboury, B., Siegel, E., & Rahmim, A. (2021). A brief history of AI: How to prevent another winter (a critical review). *PET Clinics*, *16*(4), 449-469. https://doi.org/10.1016/j.cpet.2021.07.001

Touretzky, D., Gardner-McCune, C., Martin, F. & Seehorn, D. (2019). Envisioning AI for K-12: What Should Every Child Know about AI?. AAAI-19 / IAAI-19 / EAAI-20 *Proceedings.* 33 (1). 9795-9799. https://doi.org/10.1609/aaai.v33i01.33019795

Vrkić, M. (2023). *Istraživanje umjetnosti Salvadora Dalija s djecom predškolske dobi* [Master Thesis, University of Zadar]. University of Zadar Institutional Repository. https://urn.nsk.hr/urn:nbn:hr:162:283725

Woo, D. (December 15, 2022). Sol LeWitt: The Original Prompt Engineer. *Medium.* https://dannewoo.medium.com/sol-lewitt-the-original-prompt-engineer-14fe63eab6de

Yale University Art Gallery. (n.d.). *Composition with Yellow, Blue, Black and Light Blue.* https://artgallery.yale.edu/collections/objects/43962

Strategies for Creating Visual Symbols in Preschool Children

Tomaž Zupančič

University of Maribor, Faculty of Education, Maribor, Slovenia
tomaz.zupancic@um.si

Preschool children do not draw what they see but rather what they know about the object they wish to draw. These drawings are referred to as symbols. This study investigated how these symbols are created. For the purposes of our research, we grouped the motifs that children transform into symbols during drawing into three categories. Visual examples of the selected motifs were prepared and artistic activities were carried out on their basis. The study found that it was difficult to influence the drawing of spontaneously developed symbols, e.g. a house, a person, an animal or a plant, with direct visual impressions. The similar is true for symbols that emerge later in a child's development. The study further found that it was possible to influence the drawing of those motifs that children do not develop on their own but only draw when encouraged by adults. Children introduce their own individual visual impressions into these symbols, which vary from one child to another. We developed new terminology for the different subtypes of symbols based on the results of our research.

University of Maribor Press

STRATEGIJE KREIRANJA LIKOVNIH SIMBOLOV PRI PREDŠOLSKIH OTROCIH

TOMAŽ ZUPANČIČ
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
tomaz.zupancic@um.si

Otroci v predšolskem obdobju ne rišejo tega, kar vidijo, ampak to, kar o predmetu, ki ga želijo narisati, vedo. Tem risbam pravimo simboli. V raziskavi preučujemo, kako ti simboli nastajajo. Za potrebe raziskave smo motive, ki jih otroci med risanjem pretvarjajo v simbole, razvrstili v tri kategorije. Pripravili smo vizualne primere izbranih motivov in na podlagi njih izvedli likovne dejavnosti. Ugotovili smo, da je na risanje spontano razvitih simbolov, npr. hiša, človek, žival ali rastlina, težko vplivati z neposrednimi vidnimi vtisi. Podobno je s simboli, ki nastajajo kasneje v otrokovem razvoju. Nadalje smo ugotovili, da je možno vplivati na risanje tistih motivov, ki jih otrok ne razvije sam od sebe, ampak jih riše šele na spodbudo odraslih. Otroci v ta simbol vnašajo vidne vtise, ki so pri posameznikih različni. Na podlagi rezultatov raziskave smo razvili nova poimenovanja različnih podvrst simbolov.

1   Introduction

Artistic expression of preschool children is specific and follows a certain model, with the stages of development following the same sequence (Gerlovič and Gregorač, 1976; Lowenfeld and Brittain, 1987; Arnheim, 2009; Barnes, 2009; Zupančič, 2001, 2017, Marjanovič Umek and Zupančič, 2020). The fact that all children, regardless of their social, educational, cultural or other environment, follow the same path in the development of artistic expression is due to the genetic determination of the development of artistic expression. Children typically begin to regularly make drawings around 3 years of age, before they learn formal written alphabets but after they have a rudimentary verbal command of language. During this time, the majority of children's drawings consist of exaggerated features, nonsensical shapes or objects, and other visual characteristics that appear to differ greatly from real objects in the world (Coates & Coates, 2006). At around the age of 3 years, and up to the age of 4, the child goes through a period of graphic and cognitive development characterised by the attention to form and the emergence of an initial mode of representation (Machon, 2023).

Artistic expression in the preschool period serves as a tool for the child's cognitive development or what is commonly referred to as a cognitive necessity (Muhovič, 1990). This holds true until the age of six or seven, after which the developmental role of artistic expression slowly fades. One of the most evident developmental characteristics of this period is artistic expression through symbols (Lowenfeld and Brittain, 1987; Arnheim, 2009; Barnes, 2009; Zupančič, 2001, 2017, Marjanovič Umek and Zupančič, 2020). Children up to the age of seven do not draw what they see but rather what they know about the subject they are depicting (Arnheim, 2009, et al.). "People who are not experts in art often see artistic development in rather simplistic and unilinear ways-as an ability to progress from pictorial production that "looks like nothing" to creation of images that "looks like something" (Kindler, 2004). The symbolic role of the drawing is so powerful that the entire period of early artistic development between the ages of four and seven is named after it. Horvat and Magajna (1987), Hurlock (1973), and Toličič (1979), Marjanovič Umek and Zupančič (2020) refer to this period of artistic expression as the symbolic stage, Lowenfeld and Brittain (1987) speak of the pre-schematic stage, Karlavaris (1988) of the stages of schema or developed schema, Porto (2023) speaks of the capacity to take a meta-presentational stance, and so forth.

It is therefore widely accepted in preschool art education that instructional stimuli need to foster the development of these symbols. Development progresses from simple symbols, which appear spontaneously in the child's drawings, to increasingly complex ones. The purpose of instructional stimuli is to facilitate the child's transition from the symbolic phase of artistic expression to depictions on the basis of visual impressions. Visual information gradually begins to enter the thought process of drawing.

Most art education manuals (Belamarić, 1987; Zupančič, 2001; Barnes, 2009), art curricula (Wood, 2014; Bahovec, 2019) and lesson plans (Kocjančič, 2011) take this characteristic of artistic development into account and accordingly develop educational strategies. It is therefore considered that drawing from observation is more suitable for children after the age of eight, when they become capable of perceiving and artistically processing what they see. Furthermore, art education recognises the importance of developing children's visual symbols and helps them to do so. Drawing based on direct observation is therefore also present in the preschool period, albeit to a lesser extent.

2   Purpose of the study and method

In order for art education to foster children's artistic development, it must understand it in detail. This study therefore aims to deepen our understanding of the creation of visual symbols.

We have chosen three types of symbols (and therefore motifs) that appear in children's drawings. The first motifs are the human figure and the house. These are the two most common motifs that appear in children's artwork (Belamarić, 1987; Arnheim, 2009; Barnes, 2009). These two motifs appear spontaneously in a child's drawing. In the case of drawing the human figure, this is understandable, as children's interest in themselves and the development of self-awareness are fundamental developmental characteristics. The house as a place where the child feels safe is the second spontaneously developed motif. Other motifs falling into this category include animal figures, plants, flowers, trees, cars, the sun, and clouds. For the purposes of our study, we refer to these motifs as first-level symbols.

The second motif in the study is the motif of the sailing boat. This is a specific type of vessel that appears later in the artistic expression of preschool children. It also mainly develops spontaneously and is largely present in drawings during the older preschool period, i.e. at the age of 5 and 6. Symbols that appear later in the child's drawing, but still spontaneously, are referred to as second-level symbols.

The third motif in our study are streetlights. This motif is characterised by the fact that although children aged 5–6 already know and understand this motif, it does not appear spontaneously in their artistic expression. There are two reasons for this. Firstly, these motifs are not interesting enough for children to develop an interest in them on their own, and, secondly, adults rarely offer them as motifs for the children's drawings. Such motifs have been termed third-level symbols. This study aimed to explore the differences among these three types of symbols.

2.1 Sample

The study used artwork created by children aged 4 to 6. The artwork was created as a part of a broader research (diploma thesis) on the development of motifs in the artistic expression of preschool children (Krenker, 2023). Artwork from two of the six activities carried out as a part of this research was used. A total of 24 children from the same group from Dravograd Kindergarten participated in the study, i.e. 13 boys and 11 girls. The data were collected in May and June 2023.

2.2 Data collection methods

Children's artwork was not collected under strict test conditions, but in the context of artistic activities that took place in line with conventional lesson plans. Under test conditions, artistic activities are strictly supervised and children are usually only given basic instructions on what to do. In the case of lesson plans, however, the adult integrates all the necessary educational parameters into the activity. The adult provides the appropriate motivation, clearly demonstrates the visual phenomena in question, stimulates the children's ideas and perceptions with questions, encourages artistic expression during practical work, etc. This approach has been chosen intentionally, as it aligns with the purposes of the study. The chosen perspective was also taken into account in the interpretation of the results.

We analysed products that were created during two different activities. In the first activity, children were presented with a reproduction of an artwork (Figure 1).
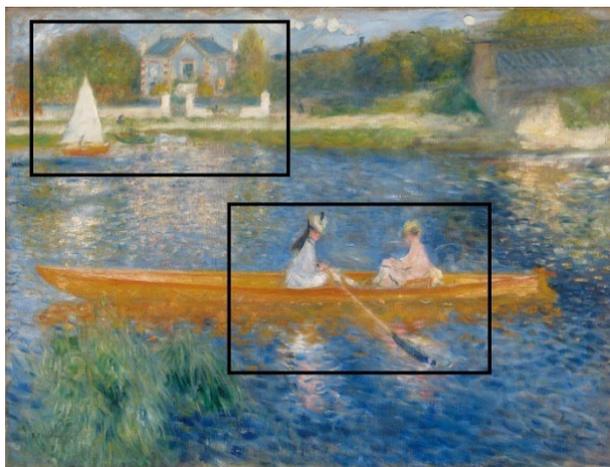

Figure 1: Pierre-Auguste Renoir, La Yole, 1875.
Source: https://en.m.wikipedia.org/wiki/File:Pierre-Auguste_Renoir_-_La_Yole.jpg

All the children were given an A3-sized reproduction. The first group of children copied the reproduction onto a blank sheet of paper using crayons. The second group of children did not work on a blank sheet, but were given an incomplete reproduction as the basis. There were two white rectangles hiding the motifs of the house, the sailing boat, and the people (Figure 1). The children's task was to fill these gaps and draw what was missing. Throughout the drawing process, both groups of children could observe the (whole) reproduction. These two activities contained first- and second-level motifs, i.e. a house, a human figure, and a sailing boat.

In the second activity, the children were introduced to streetlights during introductory motivation and looked at several different examples (Figure 2). They then drew the streetlights in the scratchboard technique. This technique was chosen because it is simple and allows for precise expression using lines. At the same time, we made sure that the children were familiar with the technique and had mastered it before carrying out the research. The streetlight motifs were available to the children for additional viewing and observation throughout the process of creating their artwork.

Figure 2: Photographs of different streetlights
Source: Krenker, 2023. With permission.

2.3 Data processing methods

The study was conducted using the descriptive, non-experimental and comparative methods of pedagogical research. The following qualitative methods were used: analysis of children's artwork, comparison between children's artwork and real visual impressions, grouping and classification of artwork, etc.

2.4 Research questions

Research question 1 (RQ1): We are interested in whether there are differences in the creation of visual symbols of different levels.

Research question 2 (RQ2): In the example of the house and the human figure, we are specifically interested in the relationship between the symbol in the child's drawing and the actual visual impression.

Research question 3 (RQ3): In the example of the sailing boat, we are specifically interested in the relationship between the symbol in the child's drawing and the actual visual impression.

Research question 4 (RQ4): In the example of the streetlight, we are specifically interested in the relationship between the symbol in the child's drawing and the actual visual impression.

3 Results and interpretation

Using the most common first-level symbol, i.e. the house, the following was established. Regardless of the varied depiction of the house in the artwork (Figure 1), it was always depicted by the children as a classic children's artistic symbol (Figure 3).
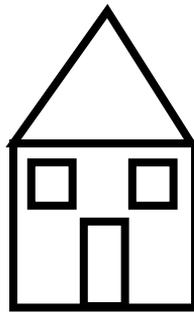
Figure 3: A child's drawing of the symbol for the motif of a house.

This can be seen in several examples in Figure 4.

Figure 4: Children's depictions of a house and a sailing boat based on Renoir's painting.

The examples in Figures 4C, D, E, and G show a typical symbol of a house as depicted by children. The house in Figure 4F can be included in the same group, except that in this case, the child has not yet mastered drawing triangular shapes, so the roof is drawn as a rectangle. The depiction in Figure 4H can also be included in

the same group, except that the use of a light colour makes it less visible. In two cases (Figures 4A and 4B), the child did not depict the motif. A similar situation can be observed in the second data collection method, when the children copied the entire reproduction (Figure 5).
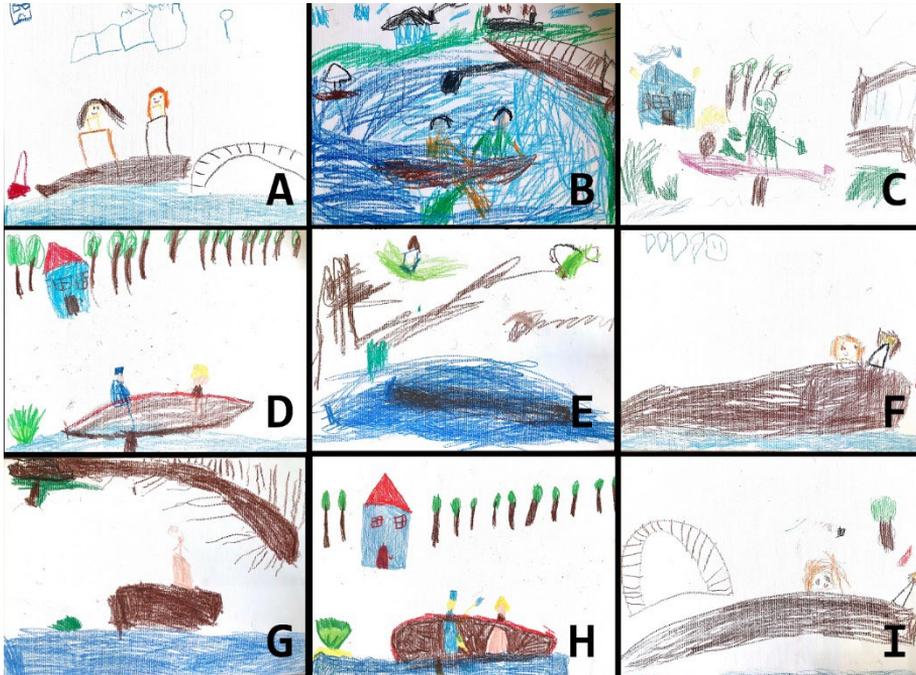

Figure 5: Children's depictions of Renoir's entire painting.

In this case (Figures 5A, B, C, D, E, and H), the typical symbol for the motif of a house as drawn by children can again be observed. In none of the children's works of art did we see the child draw at least an approximation of the house as depicted in the shown artwork instead of the classic symbol for a house (Figure 3).

In the second example, we were interested in whether children would notice the sailing boat motif and how they would draw it. As can be seen in Figure 4, the sailing boat appears in half of the examples, i.e. in Figures 4D, E, F, and G. Its image is simplified and symbolic, consisting of a triangular sail at the top, a rectangle representing the boat at the bottom, and a piece of mast connecting them (Figure 6).
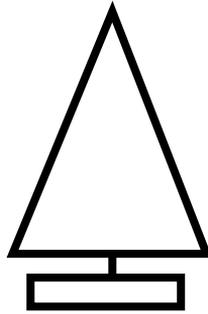
Figure 6: A child's drawing of the symbol for the motif of a sailing boat.

This depiction is not unusual, as the artist also used the same symbol in the painting. In cases where the children were observing and recreating the entire reproduction (Figure 5), the sailing boat motif was only one of many, so it was expected to appear in fewer instances. This is indeed the case, as the sailing boat can only be seen in example 5B, and, with some imagination, can also be recognised in examples 5A, F, and I. However, in these cases, the triangular shapes may not even represent a sailing boat at all, as they are not located on the corresponding side of the given sheet of paper.

It is also interesting to note that children were drawn to a motif that we had not specifically focused on when preparing the study, i.e. the motif of a tree. This motif appeared spontaneously in several drawings, for example in 4C, D, E, F, and G and in 5D, H, and I. This indicates that children enjoy drawing what interests them and what is familiar to them. The motif of the tree is the same in all the drawings where it appears. Here we again see a classic first-level symbol. The tree consists of an upright rectangle representing the trunk and a circular shape representing the crown. If the shape is round, it represents a deciduous tree and if it is triangular, it represents a coniferous tree. Since children could use various colours in this activity, the symbolic influence of colour is also visible, with the trunks being brown and the crowns being green.

In the third example, we were interested in how children depict the human figure. In the observed artwork, the human figure is not depicted in its entirety, as only the upper part of the figure is visible. This is referred to as a cut-out. Given that preschool children draw what they know about the subject and not what they see,

we assumed that children would draw the human figure in its entirety, i.e. not only the upper part of the torso, but also the legs. When a child draws a rider, even if they cannot see one leg, they will still depict both legs. If they are observing a person looking out of a window whose body they cannot see, they will nevertheless draw it. We found that children in our study used both methods. Some drew the figures in their entirety, even though the lower part of the torso is not visible in the observed motif (Figure 5C, Figures 7A, B, E, and G). It is interesting to note that we observed a difference between the two approaches. In the case where the children depicted the reproduction in its entirety (Figure 5), the human cut-out was taken into account to a greater extent (Figures 5A, B, D, F, G, H, and I). However, when they were completing a partially obscured reproduction, they also drew the legs in several cases, i.e. what is not visible. They "made up" the lower part of the body. The full figures appear in several examples (Figures 7A, B, D, F, and G). This is interesting, as the observed difference suggests that the depiction of motifs can be influenced with didactic approaches. At the same time, this phenomenon can also be linked to Jacqueline Goodnow's (1970) observation that the complexity of depicting a specific motif depends on its role in the child's overall drawing. If a child is drawing only one human figure, they will focus on that figure to a greater extent. However, if the human figure is only one part of a larger motif, such as a group of children playing in a playground, the child will pay less attention to individual figures.

Figure 7: Children's depictions of the human figure based on Renoir's painting.

In the next example, we were interested in how children depict the chosen third-level motif. Streetlights are not a common motif in the artistic expression of preschool children and therefore children do not have a developed symbol for them. This symbol is only created on the basis of instructional stimuli. Our study presented children with different models of streetlights (Figure 2), many of them very simple.

Four of them had only one lamp at the top of a straight pole (Figures 2A, B, C, and F). One streetlight had two lamps (Figure 2G) and one streetlight had three lamps (Figure 2D). Three streetlights with single lamps were very simple, with the lamp mounted at the top of the pole (Figures 2A, B, and F) Two streetlights with single lamps were a little more elaborate, with an additional element at the top, directing the light from the lamp downwards (Figures 2C and E). These streetlights provided the children with different visual impressions. By analysing the children's artwork, we found that the children were mostly drawn to the simplest image, i.e. the streetlight with a single element at the top of the pole. There were nine such works. Some children drew only one streetlight, some drew several. Interestingly, the simplest streetlights were without exception drawn by those children who drew only one streetlight (Figure 8).
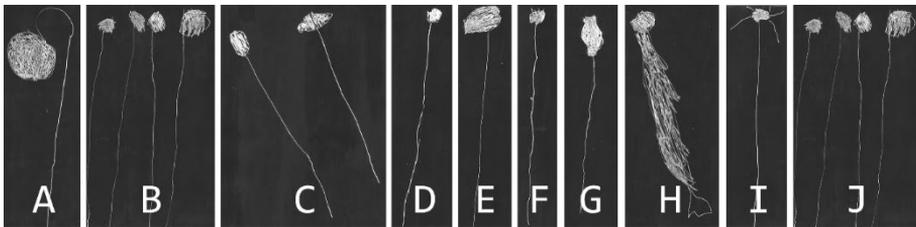
Figure 8: Children's drawings of simple streetlights.

Looking at Figure 8, it is clear that there is just one example (Figure 8A) where the child who drew only one streetlight did not choose the simplest one, but rather the one with the lamp pointing downwards. Furthermore, there are two interesting examples (Figures 8B and J) where the child drew several streetlights, but still kept to the simplest depiction. This suggests that the basic symbol for a streetlight consists of a vertical line and a circle at the top. The outline of the symbol is presented in Figure 9.
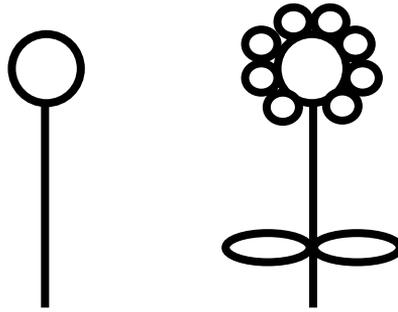
Figure 9: A child's drawing of the symbols for the motif of the streetlight (left) and the flower (right).

We can see that the symbol for the streetlight is very similar to the basic symbol for the flower (Figure 9), which falls into the category of first-level symbols. This confirms the well-known thesis that children use a single symbol for depicting different motifs (Goodnow, 1970; Arnheim, 2009; Zupančič, 2001, etc.).

When analysing the other drawings of streetlights, the following was established. Children who chose to depict more complex streetlights were particularly drawn to the two that had the lamp pointing downwards. This appears independently in three of the drawings (Figures 10A, B, and D) and in combination with the other elements also in Figures 10C and E and Figures 11B and E.

Figure 10: Children's drawings of complex streetlights.

The examples in Figure 11 show that children were equally attracted to the streetlight with three lamps (Figures 10C and E; Figures 11A, C, E, and F). Interestingly, none of the children depicted the streetlight with two lamps (Figure 2G). This may be because the two lamps on this streetlight are shaped as elongated, narrow rectangles, which the children may not have no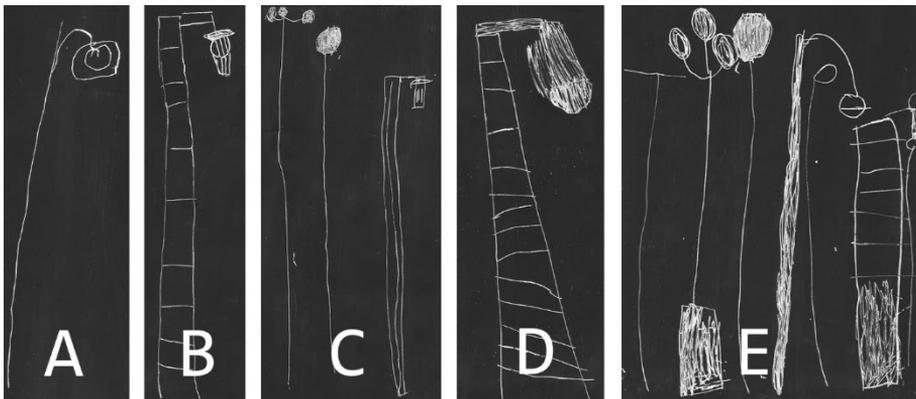ticed at all. The round, clearly visible circular shape is more in line with the child's concept of a lamp, such as light bulbs.
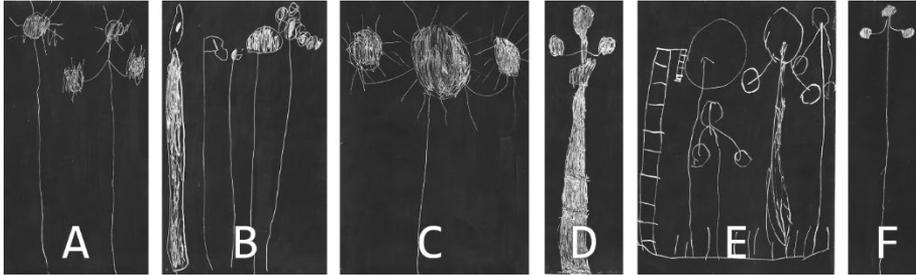
Figure 11: Children's drawings of complex streetlights.

Our analysis allows us to make the following observations. When drawing new motifs, preschool children employ two different approaches. In the first case, they use simplification and develop their symbol based on one they already know. They add or take away elements and create a new symbol. In the examples of children's artwork in Figure 8, it can be seen that the child has created a simple symbol of a streetlight from the symbol of the flower by removing the two leafs growing to the right and to the left from the stem. The child also removed the flower petals (Figure 9). In the second case, children are attracted to unusual visual characteristics in the new motif. In our case, children were drawn to the "three-headed" streetlights and the curved streetlights with their "drooping" heads. The thesis that children are attracted to the unusual is further supported by the examples of drawings of the streetlight that has a different pole (Figure 2E). This pole is not a simple vertical rod, but rather a double rod that is connected by horizontal elements. Such a pole looks very much like a ladder. This visual feature attracted several children, and they drew it very clearly (Figures 10B, D, and E; Figure 11E).

No direct evidence exists for the following claim; however, we can reasonably infer the following. A child's decision on which strategy to adopt when creating a new visual symbol is related to their stage of artistic development. We make this claim

on the basis of the following fact: the more complex drawing of "multi-headed", "drooping" and "ladder-like" streetlights appears in drawings where children have drawn several different streetlights. The fact that a child drew several streetlights (even though this was not a requirement and some of them only drew one) indicates a greater interest in artistic expression and longer periods of concentration on the part of the child. Both of these are signs of a higher developmental stage.

4   Conclusion

The results of the study allow us to conclude that there are differences in the creation of symbols of different levels (RQ1). First-level symbols, i.e. the symbols that children develop first, are deeply ingrained in the child's consciousness and therefore difficult to change. Even when presented with a different house and in direct observation, children draw the house as a classical symbol (RQ2). The same applies to second-level symbols. When drawing the sailing boat, the children depicted a classical symbol (RQ3). However, it is true that they were drawing the sailing boat based on a work of art where the artist also used a simple symbol. This aspect warrants further research. A new study could offer children photographs of different types of wind-powered vessels and observe how they draw them based on visual impressions. The study could be designed similarly to how we structured the work with the streetlight motif in this study. The most significant deviation from the established ways of creating symbols was observed in the drawing of streetlights (RV4). Two different strategies were identified. Some children resorted to simplification when creating a new symbol. These children used an already familiar symbol and modified it accordingly. Other children delved into the visual impressions and created a completely new symbol. The thus created symbol did not resemble any known symbol from before. We presume that this occurs in older preschool children and is associated with a higher level of artistic development. Some of these drawings (Figures 10 and 11) are so complex that they already go beyond the symbolic stage of drawing.

Based on the findings of our study, we propose that new terms be introduced. We propose the term determinate symbols to be used for the basic symbols in children's drawing, which develop first and spontaneously. This category includes motifs of the human figure, house, animals, plants, the sun, clouds, etc. For the second type of symbols, we propose the term mixed symbols to be used. This category includes

all sub-types of motifs that appear later, such as various types of vessels, different modes of transportation, various types of plants, different animal species, and so on. Children develop these symbols partially on the basis of their knowledge of the subject and partially on the basis of visual impressions. For third-level symbols, i.e. symbols which children do not develop spontaneously but start drawing when given appropriate instructional stimuli, we propose the term open symbols to be used. This category includes the streetlights used in this study. This category could also include a range of everyday objects that surround us and which we reasonably believe might be of interest to older preschool children.

References

Arnheim, R. (2009). Art and Visual Perception: A Psychology of the Creative Eye, The New Version. Berkeley: University of California Press.

Atkinson, D. (2009). How Children Use Drawing. In: S. Herne, S. Cox and R. Watts. Readings in Primary Art Education (pp. 139-152). Bristol, UK, Chicago, USA: Intellect.

Bahovec, E., D. (Ed.). (2019). Kurikulum za vrtce: predšolska vzgoja v vrtcih. Ljubljana: Ministrstvo za izobraževanje, znanost in šport: Zavod Republike Slovenije za šolstvo. https://www.gov.si/assets/ministrstva/MVI/Dokumenti/Sektor-za-predsolsko-vzgojo/Programi/Kurikulum-za-vrtce.pdf

Barnes R. (2009). Teaching Art to Children 4–9, London: School of Education, University of East England.

Belamarić D. (1987). Dijete i oblik. Zagreb: Školska knjiga.

Berce Golob, H. (1993). Likovna vzgoja. Načini dela pri likovni vzgoji. Ljubljana: DZS.

Coates E., Coates A. (2006). Young children talking and drawing. *International Journal of Early Years Education*, 14(3), 221–241. https://doi-org.ezproxy.lib.ukm.si/10.1080/09669760600879961

Efland A. (2002). Art and Cognition; Integrating the Visual Arts in the Curriculum, New York, Teachers College Columbia University.

Frisch, N. S. (2006). Drawing in Preschools: A didactic experience. The Journal of Art and Design Education. 25(1), 74-85. DOI:10.1111/j.1476-8070.2006.00470.x

Gerlovič, A. & Gregorač. I. (1976) Likovni pouk otrok. Ljubljana: Mladinska knjiga.

Goodnow, J. (1977). Children's Drawing. London: Fontana, Open Books.

Hickman, R. (2010). Why We make Art and Why Is It Taught. Bristol, UK: Intellect.

Horvat, L, & Magajna, L. /1987). Razvojna psihologija. Ljubljana: Državna založba Slovenije.

Hurlock, E. (1973). Adolescent development. New York: McGraw-Hill.

Karlavaris, B. (1988). Metodika likovnog odgoja 2. Zagreb: Grafički zavod Hrvatske.

Kindler, A., M. (2004). Researching Imposisible? Models of Artistic Development Reconsidered, In: E., W. Eisner & M., D. Day. (Eds.). Handbook of research and policy in Art Education. New York, London: Routledge. (233-252)

Krenker, M. (2023). Promet kot likovni motiv pri likovnih dejavnostih predšolskih otrok [Traffic as an Art Motif in Art Activities in the Preschool Period] (Diplomsko delo). Maribor: UM PEF. https://dk.um.si/Dokument.php?id=169043&lang=slv

Kocjančič, N., F. (Ed.). (2011). Učni načrt. Program osnovna šola. Likovna vzgoja. Ljubljana: Ministrstvo za šolstvo in šport: Zavod RS za šolstvo. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_likovna_vzgoja.pdf

Lowenfeld, V. & Brittain, L. W. (1987). Creative and Mental Growth (8th edition). Upper Saddle River, New Jersey: Prentice Hall.

Machon, A. (2023). Drawings by Children Between 3 and 4 Years of Age. In: R. Horowitz. (Ed.). The Routledge International Handbook of Research on Writing, New York: Routledge (20-35). DOI: 10.4324/9780429437991-3

Marjanovič Umek, L. & Zupančič, M. (Eds.). (2020). Razvojna psihologija. Ljubljana: Znanstvena založba Filozofske fakultete.

Matthews J. (2004). "The Art of Infancy", in: Handbook of Research and Policy in Art Education, Eds. E. W. Eisner, and M. D. Day, New York, London: Routledge, 2004, pp. 253–298.

Muhovič J. (1990). "Odnos med otroškim likovnim izražanjem in likovno ustvarjalnostjo odraslih" [The Relation Between Children's and Adults' Artistic Creativity], in: Athropos, 22 (3–4), pp. 9–20.

Porto, A. (2023). The picture theory of symbolic development in early childhood. Theory & Psychology, 33(6), 814-834. https://doi-org.ezproxy.lib.ukm.si/10.1177/095935432311929

Toličić, I. (1979). Razvojna psihologija. Ljubljana: Zavod SR Slovenije za šolstvo.

Watts R. (2009). "Attitudes to Making Art in the Primary School", in: Readings in Primary Art Education, Eds. Steve Hern, Sue Cox, and Robert Watts, UK Bristol, USA, Chicago: Intellect, 2009, pp. 287–299.

Wilson B. (2004). "Child Art After Modernism: Visual Culture and New Narratives", in: Handbook of Research and Policy in Art Education, Eds. E. W. Eisner and M. D. Day, New York, London: Routledge, 2004, pp. 299–328.

Wood, E. (2014). Play, learning and the early childhood curriculum. Los Angeles: Sage.

Zupančič T. (2001). Likovno-ustvarjalni razvoj otrok v predšolskem obdobju [The Artistic and Creative Development of Children at Preschool Age]. Ljubljana: Debora.

Zupančič T. (2017). Art and artists in kindergarten - assumptions and examples. Acta Academiae Artium Vilnensis = Vilniaus dailęs akademijos darbai. 84, pp. 35-51.

AN INSIGHT INTO THE PRACTICAL TRAINING OF FINE ART STUDENT TEACHERS IN SLOVENIA THROUGH THEIR VISUAL AND MULTIMODAL REFLECTIONS

JANJA BATIČ
University of Maribor, Faculty of Education, Maribor, Slovenia
janja.batic@um.si

An important aspect of the teaching practice of future art educators is the development of their reflection skills. Writing reflections can be of great help to students in this regard. In the academic year 2021/22, students reflected on guided practice in the form of a visual essay. We were interested in how students experience practical training. We were particularly interested in the kind of messages students offer about practical training when they can express themselves visually. We used a visual research approach, as visual research strategies are a direct and tangible way of understanding the experience of the participants. We found that the visual essays differed in their artistic expression and the content that students wanted to emphasize (awareness of one's own body, experiencing progress, experiencing effort and uncertainty, the contrast between fears before the performance and pleasant feelings after the performance, time constraints, etc.).

University of Maribor Press

VPOGLED V PRAKTIČNO USPOSABLJANJE ŠTUDENTOV LIKOVNE PEDAGOGIKE V SLOVENIJI SKOZI NJIHOVE VIZUALNE IN MULTIMODALNE REFLEKSIJE

JANJA BATIČ

Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
janja.batic@um.si

Pomemben vidik pedagoške prakse bodočih likovnih pedagogov je razvijanje njihovih sposobnosti refleksije. Pri tem je študentom lahko v veliko pomoč pisanje refleksij. V študijskem letu 2021/22 so študentje likovne pedagogike refleksijo vodene prakse podali v obliki vizualnega eseja. Zanimalo nas je, kako študentje likovne pedagogike doživljajo praktično usposabljanje. Posebej nas je zanimalo kakšna sporočila podajajo študentje likovne pedagogike o praktičnem usposabljanju, kadar se lahko izrazijo vizualno. Uporabili smo vizualni raziskovalni pristop, saj vizualne raziskovalne strategije omogočajo neposreden in otipen način razumevanja doživljanja udeležencev. Ugotovili smo, da se vizualni eseji razlikujejo po likovnem izrazu in vsebini, ki so jo želeli študenti poudariti (zavedanje lastnega telesa, doživljanje napredka, doživljanje naporov in negotovosti, nasprotje med strahovi pred nastopom in prijetnimi občutki po nastopu, časovna stiska ipd.).

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

583

1   Introduction

Study programmes that train future art educators differ in the amount of studio experience (Vella, 2016) and pedagogical experience that students get through practical training. The interweaving of artistic and pedagogical content has a significant impact on the development of the identity of an art teacher. Thornton (2005, 2013) talks about the concept of the artist teacher, which combines the qualities, attitudes, knowledge and skills of an artist and a teacher as a single identity in which both aspects are equal. Therefore, it is understandable that practical training is an important part of study programmes that educate future teachers.

Concerning practical training, Kowalchuk (1999, p. 71) stated: "For student teachers, it is a period of putting learning into practice, of relating theory to reality." Practical training represents an important and irreplaceable learning experience (Rorrison, 2010) which has not only short-term effects but also long-term ones, since the success of the practical training affects graduates' future career decisions and professional formation (Sprague & Percy, 2014). Problems faced by future art teachers in practice may be related to class management, their organizational skills (especially in the organization of students' practical work), lack of in-depth content and organizational preparation for lessons, inability to adapt flexibly to the different needs of students (ability to explain the art task in different ways), insufficient knowledge of different artists, etc. (Kowalchuk, 2000). The success of the practical training depends on the relationship established between mentors and students, and on the tasks that students have to complete—namely, that the students follow the mentors' instructions, follow them in different situations, observe them, and that mentors direct, guide, evaluate and significantly influence the students on what kind of experience students will gain (Ulvik, Helleve, & Smith, 2018).

An important aspect of the practical training of future art educators is the development of their reflection skills. Dewey (1910, p. 6) stated: "Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends, constitute reflective thought." One way that allows students to develop the ability to reflect is through reflective diaries. "Reflective diaries create a platform for personal feelings and narratives by involving learners in processes of self-assessment and self-reflection and are considered an effective tool in teacher training practice" (Barromi

Perlman, 2016, p. 1) Furthermore, reflective diaries in various forms are an important tool in self-learning (Delacruz & Bales, 2010; Sangvanich & Chinokul, 2018) and they can be viewed as "training grounds for critical reflective practice" (Pavlou, 2021, p. 256).

Reflective diaries and reflections can differ based on the communication mode. Bertling (2019, p. 30) notes, "visual reflections uses imagery, where subject matter, materials, techniques, and compositional element can communicate meaning metaphorically". A verbal communication mode is used more often, but reflective diaries can also be visual or multimodal. Visual reflections often include words, which can turn them into multimodal text or ensembles. Multimodal ensembles include three aspects, namely textual elements, visual images and design elements (Serafini, 2014). One form of multimodal text is the visual essay. A visual essay is characterized by the fact that it conveys information through a sequence of images and the juxtaposition of images (juxtaposition brings a new message) (Pauwels, 2012). Roes and Pint (2017, p. 2) note: "In the process of making images of our environment, different bodily experiences, like affects, emotions, feelings and movements are mobilised in the creation of meaning." A visual essay often also includes shorter text (titles, provocative questions, intra-iconic text, etc.) and/or longer text (introduction, text next to images, and conclusion). The whole multimodal composition, however, usually presents some critical commentary on a topic and acts as a kind of explanation or discussion. The visual material included in the visual essay is original (photographs, drawings, illustrations) or acquired and/or modified.

Practical training of second level fine art students at the Faculty of Education of the University of Maribor takes place in two ways. Firstly, students are assigned three learning units which they complete with the help of a mentor at the selected high school (guided practice). Secondly, students undergo three weeks of practical training at a secondary school. In three weeks, fine art students teach high school students (six teaching units), and they observe and analyse the lessons conducted by their mentor (six teaching units) and other fine art students (six teaching units). After completing the practical training, students write a report (reflection on the completed practical training). Student reflections are often very sparse and impersonal.

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

585

2 Method

2.1 Objectives and research questions

In the 2021/22 academic year, students reflected on guided practice in the form of a visual message. We noticed that when fine art students give their impressions of practical training exclusively in words, they usually write impoverished texts in which they state facts. Entries are usually very generic and impersonal. As part of the practical training, we presented them with the features of the visual essay, which was a less familiar way of conveying ideas and knowledge.

In the research, we were interested in how fine art students experience practical training. We were particularly interested in what kind of messages fine art students give about practical training when they can express themselves visually and/or multimodally.

The following research questions were asked:

- – In what way will the fine art students present their practical training experience?
- – What will be their messages about practical training?
- – What will they highlight in their messages?

2.2 Research sample

A convenience research sample was used. In the 2021/22 academic year, 16 second level fine art education students completed guided practical training. We included in the research the reflections of nine students who agreed to use their visual essays for research purposes.

2.3 Data collection and processing

We used a visual research approach. Visual research strategies are a direct and tangible way of understanding the experience of research participants (Patton & Higgs 2011). For the purposes of research with the help of visual images (visual arts-

based research practices), we can use different modes of artistic expression, e.g. photography, painting, drawing, comic book design, collage, sculpture, ceramics, installation, combined techniques, etc. (Leavy, 2020). Springgay, Irwin, and Kind (2005) establish the term "a/r/tography" to refer to a creative and interdisciplinary research methodology combining art, research, and teaching to denote research through the process of creating works of art and writing, where the two elements are not repeated but the connection between the two creates additional meaning. This is also typical for all multimodal texts or multimodal compositions in which each communication code carries a certain meaning and only summative analysis reveals the common meaning (Jewitt, 2008). In the analysis of visual and multimodal works, we proceeded from a/r/tography, which also brings understanding of the message through metaphors and metonymies (Springgay et al., 2005).

3   Results

3.1   Leporello

Figure 1: Leporello

The student prepared her reflection on the practical training in the form of a leporello (paper folded into an accordion-pleat style) (Figure 1). Leporello consists of twelve pages. The first and last pages are intended as the front and back of the book.

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

587
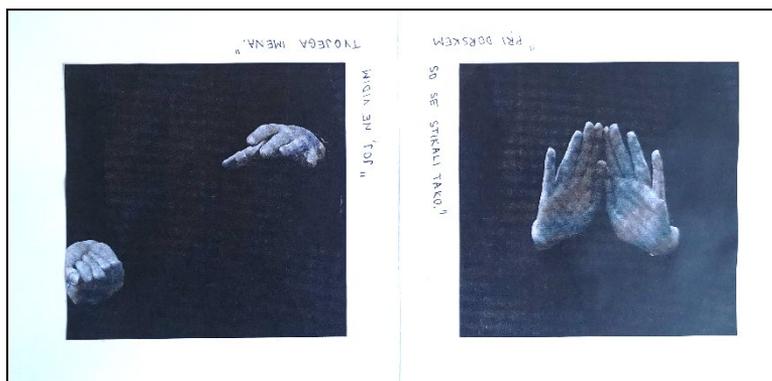
Figure 2: Leporello (detail)

On the cover, the back and six pages, the student showed eight hand gestures on a black background (photographs) and supplemented them with text (Figure 2), while on four pages she inserted only the text on a white background. The first (Figure 3) and the last gesture (Figure 4) show the beginning and the end of a lesson: the former indicates uncertainty and stress, while the latter also maintains a high level of tension and unrest.
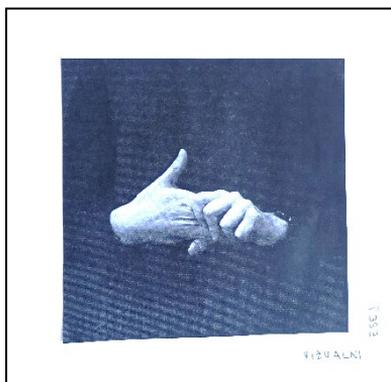
Figure 3: Leporello (detail)   **Figure 4: Leporello (detail)**
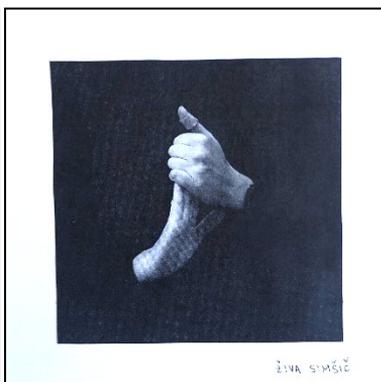
Next to each gesture are added sentences that the student uttered during a certain gesture, namely: (1) "Oh, I don't see your name"; (2) "At Doric [column - author's note] they met like this"; (3) "He is considered a respectable citizen who carries calves"; (4) "Two volunteers striking a pose"; (5) "He looked really strong"; (6) "It

is covered from floor to ceiling with frescoes"; (7) "Experienced"; (8) "Teaching"; (9) "Fine arts"; (10) "Arts."

3.2 Collage on a black background

Figure 5: Collage

This student prepared a collage (Figure 5) of photographs, inscriptions, illustrations, and reproductions of works of art and decorated the composition above and below with a meander. She added a brief text next to it. She used two photos of the class with herself standing in front of the blackboard and teaching the students. In the foreground, she added a stylized illustration of herself (with a blank face, no eyes, no nose, and half of her face covered by a mask), and we also see an illustration of a Greek vase and the coronavirus. In the collage, she included two questions that she asked the students, namely "what is depicted in this work?" and "what do you know about ancient Greece?", as well as the words "stylized" and "preparation". In the lower part of the collage, the Kahoot code and a yellow post-it note with the inscription "believe in yourself" have been added.

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

589

In the accompanying text, she pointed out that she was very nervous at the beginning, that she gradually became more confident and relaxed during teaching, and that her communication with the students gradually improved. She also mentioned good cooperation with mentors and problems speaking clearly under a mask.

3.3   Ten drawings
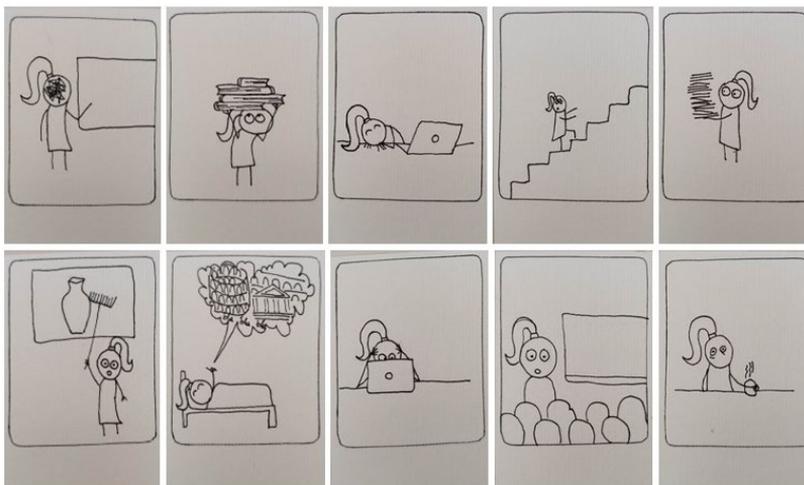
Figure 6: Ten drawings

This student produced a series of ten simple drawings (Figure 6), where she presented her teaching experience. On the first, she depicted herself in front of the blackboard as a teacher with a scrawled face as a metaphor for the confusion in her head. In the second drawing, she depicted herself carrying a book on her head (burden); in the third she is depicted falling asleep next to the laptop (fatigue). Then, in the fourth drawing, she showed herself climbing up the stairs (overcoming obstacles). In the fifth, she is depicted with a set of books in her hands (upright posture, sovereignty). In the sixth drawing, she is standing in front of a blackboard: there is an antique vase on the blackboard, and she is pointing at it with a broom (classroom improvisation). In the seventh drawing, she is depicted lying in bed and dreaming about the learning material (all-encompassing experience of the teaching performances). In the eighth drawing, she again depicted herself in front of the computer, staring at it and supporting her head (even more preparation for class and

studying of the material). In the ninth drawing, she depicted herself in front of the class with her eyes wide open (astonishment, perhaps surprise at the reactions of the students). In the tenth drawing, she is depicted with a cup of coffee and large dark circles (fatigue).

3.4 Photo transformation (before and after)

Figures 7 and 8: Transformed photos

This student took two black-and-white photos of her desk, top-down view (Figures 7 and 8). In the first photo, the table is full of various objects (keyboard, computer mouse, scissors, papers, pen, string, glass, folder with the University of Maribor logo). Inscriptions are added to the photo (inscriptions are written by hand and on lined paper, small print and small letters ("Where to start?", "Too much", "What else?", "Does this make sense?", "?", "Find yourself", "I can't wait for this to be over"). The next photo is almost empty: we see a closed laptop, a computer mouse, a glass. The inscription is added (again on lined paper, handwriting, capital letters) "How was it? "Great." The student showed the state before the teaching performance in a class (preparation, confusion, uncertainty, restlessness) and after the performance (satisfaction, calmness).

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

591

3.5   Collage and handwritten text
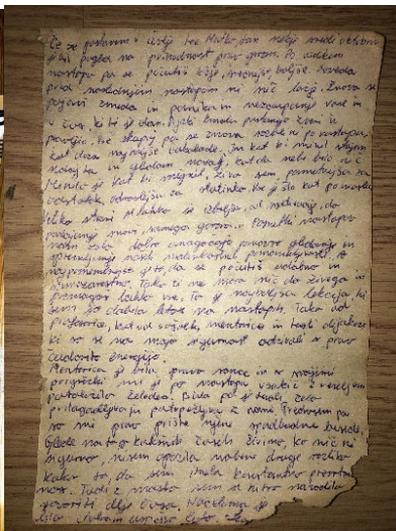
Figure 9: Collage   Figure 10: Handwritten text

This student prepared a collage and text (Figures 9 and 10). She created a collage of black and white photocopies of photographs of herself and artworks, three coloured illustrations (reminiscent of old sewing magazines), and schematic representations of Greek columns. Individual images are supplemented with various notes. Some are about preparing a teaching lesson and performance. ("What am I doing this afternoon until 11:30 p.m.? Preparing for Monday"; "Don't stick to the written preparation like a blind person clinging to a lamp post, be willing to improvise"; "Adapting"). Some refer to the student's introductory presentation—i.e. the first words the student says in class. Possibilities are written, but also crossed out ("Hello. How are you? Hi. "). The student added a URL link https://www.youtube.com/watch?v=faG5mmkDbyc to the song "Teenagers" (My Chemical Romance), which in the first verse problematizes the attitude of adults to teenagers ("They're gonna clean up your looks, with all the lies in the books to make a citizen out of you"). Lead singer Gerard Way said about this song: "It's a commentary on kids being viewed as meat; by the government and by society. That's how I felt in school, and after 9/11 happened that's how I felt in general" (Teenagers by My Chemical Romance, n.d.).

The student connects this URL link with a red line with the word "expectation", which is connected with the word "reality" and then with the note "I can't wait for the teaching practice". The text "Greek art" appears twice, and "Today we will focus on Greek art" once. The student has added a photo of a negative rapid test for covid. The added text is written in capital letters and additionally typed so that it can be read without difficulty. Also in the written text, the student points out the tiring period of preparing for the teaching performances. She highlights the lack of time, as the semester is shortened by four weeks due to the teaching practice. She also highlights the fears that appear before teaching a class and the pleasant feelings that appear after the teaching performance. She mentions her mentor as an important person. She recognizes that there are still many things she can improve (motivation of students, presentation of material, speech), but that the most important thing is that she feels comfortable and confident in the class. She also points out that it was difficult for her to get used to speaking with a mask.

3.6   Collage with a parking ticket

Figure 11: Collage with a parking ticket

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

593

This student presented her experience in a collage (Figure 11), to which she added a description in text. She included in the collage photos of herself in the classroom, reproductions of artwork, and words (associated with teaching performance—namely written preparation, collaboration, Greek art, hybrid performance, finding a parking space). In the collage, she also added the questions that were occurring to her at the time, namely, will I be able to succeed, when will I finally have free time, where will I find a parking space. In the central part of the composition, she placed the title (Teaching performances in high school) from which the other elements radiate. She explained her decision for the selected composition in the added text, where she wrote that the circle in the centre of the composition reminds her of a clock. The time crunch was always present. She added her car to the composition as she spends a lot of time on the road (driving to college and home), and the parking ticket from the last day of her teaching practice in high school. She chose photos of herself by focusing on her gestures while watching videos of her teaching performance and observing how her gestures change depending on certain situations in the classroom.

3.7 Collage with a blue line

The student prepared a collage (Figure 12) by taking one page of a written preparation for a teaching performance in high school as a basis and lighten the colour of the document. On this background, she placed black and white photos and inscriptions and interlaced everything with blue lines. The first photo shows an excerpt from the book or textbook: next to it is the inscription "Read, translate...". In the second photo, there is a view of the computer screen, on which the written preparation is open. The inscription "Write..." is added next to it. The third photo shows part of a clock and next to it is the inscription "Free time?... What is this?" The fourth photo shows a set of masks and the caption "You just have to breathe...". The fifth photo shows the student's legs and running shoes. Added text: "The evening before…relaxation." The last image is a black and white reproduction of Norman Rockwell's (1894–1978) fine art work "Young Valedictorian c. 1922". Shown is a girl in a white dress receiving her diploma. The word "Performance" is added.
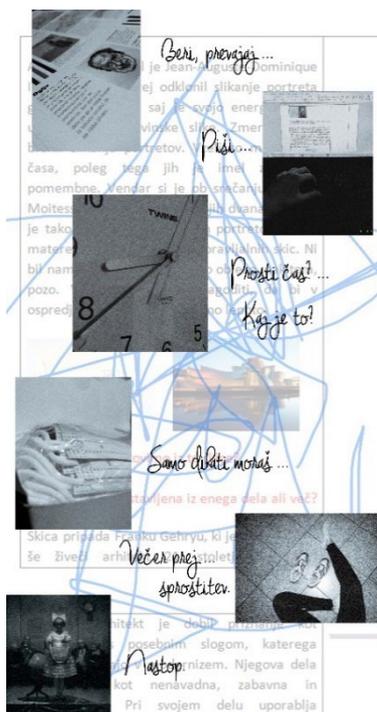
Figure 12: Collage

3.8   Illustration

Figure 13: Illustration

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

595

The student created an original illustration (Figure 13) in which she included some text. The illustration is a combination of line drawings, partially coloured in soft, pastel colours. In the central part is the title "Me through practice from 1. to - ." In the lower left part, she has depicted two Greek columns on which a girl sleeps. She has added two teaching performance portraits of herself, but it looks like the self-portraits are continuing outside the format. In the lower left part, she has depicted a girl in flowers with a book in her hands. In the upper part of the composition, she has depicted a division with the mind on the left and the heart on the right. The mind is depicted as a brain in the head asking the question "Do you know everything? Definitely?" The heart is shown as a stylized heart with the words "Beautiful peaceful". In the upper part, there is the inscription "Everything will be ok! Everything was ok!"

3.9   Written preparation for a lesson
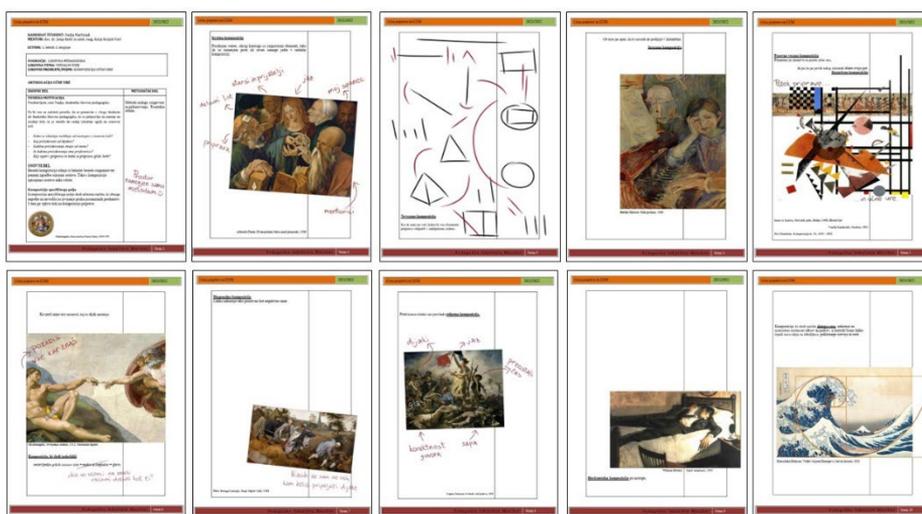
Figure 14: Written preparation for a lesson

This student prepared the visual essay in the form of a teaching preparation, choosing the composition of the lesson as the topic (Figure 14). She designed the introductory motivation as a conversation with the students, asking them how the new experience differs from teaching performances in elementary school, what to expect from the high school students, what expectations the high school students

have, what expectations the teacher has, what to include in the preparation and how to start writing the teaching preparation in the first place. Then, in the written preparation, she included an explanation of the composition and specific forms of the composition (circular, unbound, cut out, etc.). She compares each composition to the dynamics in the class and her own feelings (initial uncertainty, fear of unpredictable situations and final optimism). For example, for a loose composition, she writes the following explanation: "When you yourself do not know how to integrate all the elements of the preparation into a finished whole." Next to the diagonal composition, she includes the text "It can indicate both a positive and a negative direction." She chose Pieter Bruegel the Elder's work "The Blind Leading the Blind" (1568) as an example and wrote "Sometimes you don't know where you want to take the students." She ends the preparation with a reproduction of Katsushika Hokusai's "The Great Wave off Kanagawa" (1831), in which she engraved the scheme of the golden ratio. At the same time, she wrote the following explanation: "A composition that follows the principle of the golden ratio suggests an endless possibility of slips and falls from which we will be able to draw new ideas for improvement, professional development and growth."

4   Discussion

The results of the analysis show that each student chose her own approach. Various visual essays were created. In most cases, images are combined with text. Three main approaches can be observed: short text in the image, short text below the image, and longer added text. In one case, ten drawings were created without text. The visual material used by the students in the visual essays is diverse: photos, photoshopped photos, photos obtained from videos, drawings, illustrations, schematic representations and reproductions of famous artworks. The interaction between text and image is complementary, the images emphasizing the intensity of the experience.

The resulting artworks (visual essays) each have their own artistic language. They differ from each other, although the students describe a similar experience. In four cases, students designed the visual essay as a collage. Collage is a form based on the assembly of pre-existing materials and is "closely associated with 20th-century art, in which it has often served as a correlation with the pace and discontinuity of the modern world" (Kachur, 2003, para. 1) Collage as an art form often appears in the art therapy process and can help to create meanings by juxtaposing images

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

597

(photographs, magazine clippings) and making connections between them (Malchiodi, 2012). The students' decision to use collage is expected as it has a lot of narrative power. At the same time, collages appear less structured, chaotic and intertwined.

The following five works by the students are very different in form, although the illustration made by the student works like a kind of collage in terms of the composition of the images. In the other works—i.e. in the leporello, photo transformation (before and after), ten drawings, and written preparation for the lesson—the time dimension is given. Linearity is emphasized in the leporello, ten drawings and written preparation, as we move with our eyes from left to right, from one page to the next. In the photo transformation work (before and after), we observe only two time periods, the chaotic state before the teaching performance and the calm afterwards. A simultaneous succession (Nikolajeva, 2003) is visible in the leporello, as it is a sequence of depictions of the human figure (in this case, hands) in time-separated moments which are perceived as a whole. The changes that occur in each subsequent frame indicate the time difference between the previous and the next scene. In the only visual essay where there are just ten drawings and no text, we recognize the elements of a wordless picture book. When reading a wordless picture book, the reader must extract meaning from the pictures, which offer multiple potential meanings; individual pictures or scenes are usually separated into individual frames (Lysaker, 2019).

The students conveyed the message with the help of metaphors at both the level of motive and the level of composition. We understand a visual metaphor as a symbol for something else (Steen, 2018). For example, one student uses an artist's artwork (Norman Rockwell's "Young Valedictorian") in her visual essay to show the importance and seriousness of performing in front of high school students. She chose a piece of art that shows a neat little girl in a dress with a big bow in her hair with clasped hands. The little girl is standing on a stage. We recognize the little girl as a metaphor for the feelings of smallness and immaturity regarding the role that lies before the student. On the level of composition, we can observe the free compositions offered by the collages and understand them as representations of all-encompassing and various factors that influence the course of practical training. They emphasize feelings of uncertainty and questioning concerning students' own words and actions. In linear compositions, however, we recognize a tendency

towards balance and control over the course of practical training and one's own emotions.

References to Greek art appear in most of the visual essays, which is to be expected. The student teachers receive guided teaching practice during the winter semester at the high school while the high school students are studying Greek art, according to the curriculum. Other themes are also present (e.g. composition in fine arts), but in concrete examples most references to Greek art are visible in words and images.

The central message that can be understood from the visual essays is the all-encompassing feeling of a new experience, the students' striving for successful preparation for teaching, and the presence of the dominant subject matter (Greek art). The students' messages are not impersonal as they differ in artistic expression and the content they wanted to emphasize. Through visual and multimodal reflections, the following topics emerged:

- Awareness of one's own body. Students usually have problems with how to stand in front of high school students, how to introduce themselves, etc. This uncertainty is shown very well in the leporello with hand gestures (gestures during teaching performances). Gestures and the human figure are present in most visual essays.
- Experiencing one's own progress. The experience of progress is emphasized more in the accompanying notes than in the pictures. Barromi Perlman (2016, p. 1) notes: "Focusing on emotions, inhibitions and personal growth are part of the approach to critical reflective writing, in which the practitioner takes a conscious look at his emotions, experiences, actions, and responses, in order to draw out meaning and have a higher level of understanding."
- Experiencing efforts, insecurities and time constraints is present throughout the visual essays in both words and images. In several visual essays, the demanding and time-consuming writing of preparations and the fear of how the performance in class will go are highlighted.
- The contrast between fears before the teaching performance and pleasant feelings after the performance is present in some visual essays.

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

599

– Fears unrelated to teaching practice (finding a parking space on time, shortness of breath when speaking from behind a mask, fear of Covid, testing for Covid). Students teachers' fear of Covid has also been shown in other research and has affected the course of student teachers' practical training (Delamarter & Ewart, 2020).

With the help of the analysis of visual essays, we found that the students approached the preparation of their reflections very seriously. Their reflections are in-depth and include various aspects of practical training. Visual diaries and visual essays are a meaningful form of monitoring the teaching practice of fine art students, as they allow students to express themselves through artistic means, which can help them make more sense of their teaching practice and connect it to their artistic expression. Zupančič (2020, p. 37) notes: "Art provides insight into what we miss by looking through conventional forms, and this applies at least partly to the innovative model for creating the student teaching report."

The results cannot be generalised because of the nature of our research, but they can give us a better insight into the understanding of the importance of the visual and multimodal way of expression in the formation of in-depth reflections among fine art students. At the same time, the results of our study raise questions about the importance of developing visual and multimodal literacy among students and educators. The materials used in the pedagogical process are highly multimodal, which means that messages are conveyed with different modes of communication. In a multimodal text, a visual communication mode is most often present. Therefore, in the future, the development of multimodal and visual literacy should be approached more systematically in the field of education.

References

Barromi Perlman, E. (2016). Using visual reflective diaries of photographs of school buildings as a tool for empowering students in teacher training. *International Journal of Qualitative Methods*, *15*(1). https://doi.org/10.1177/1609406916653760

Bertling, J. G. (2019). Layered collaborative visual reflection: Sharing lived experiences and making meaning. *Art Education*, *72*(3), 28–38. doi:10.1080/00043125.2019.1578022

Delacruz, E., & Bales, S (2010). Creating history, telling stories, and making special: Portfolios, scrapbooks, and sketchbooks. *Art Education*, *63*(1), 33–39. doi:10.1080/00043125.2010. 11519051

Delamarter, J., & Ewart, M. (2020). Responding to student teachers' Fears: How we're adjusting during the COVID-19 shutdowns. *Northwest Journal of Teacher Education*, *15*(1), 1–10. https://doi.org/10.15760/nwjte.2020.15.1.3

Dewey, J. (1910). *How we think*. D.C. Heath & Company.

Jewitt, C. (2008). Multimodality and literacy in school classrooms. *Review of Research in Education*, *32*, 241–267.

Kachur, L. (2003). Collage. *Grove Art Online*. https://www.oxfordartonline.com/groveart/view/10.1093/gao/9781884446054.001.0001/oao-9781884446054-e-7000018573

Kowalchuk, E. A. (1999). Perceptions of practice: What art student teachers say they learn and need to know. *Studies in Art Education*, *41*(1), 71–90. https://doi.org/10.2307/1320251

Kowalchuk, E. A. (2000). In their own words: What student art teachers say they learn and need. *Art Education*, *53*(3), 18–23. https://doi.org/10.1080/00043125.2000.11652387

Leavy, P. (2020). *Method meets art: Arts-based research practice*. Guilford Press.

Lysaker, J. T. (2019). *Before words: Wordless picture books and the development of reading in young children*. Teachers College Press.

Malchiodi, C. A. (2012). Art therapy materials, media, and methods. In C. A. Malchiodi (Ed.), *Handbook of art therapy* (2nd ed., 27–41). Guilford Press.

Nikolajeva, M. (2003). Verbalno in vizualno: Slikanica kot medij. *Otrok in knjiga*, *58*, 5–26.

Patton, N., & Higgs, J. (2011). Envisioning visual research strategies. In M. Smith (Ed.), *Creative spaces for qualitative researching: Living research*. Brill. https://brill.com/view/book/9789460917615/BP000013.xml

Pauwels, L. (2012). Conceptualising the 'visual essay' as a way of generating and imparting sociological insight: Issues, formats and realisations. *Sociological Research Online*, *17*(1), 76–86. https://doi-org.ezproxy.lib.ukm.si/10.5153/sro.2575

Pavlou, V. (2021). Reflective visual journals as a means for promoting generalist preservice teachers' professional identity in art education. *International Journal of Education Through Art*, *17*(2), 253–270.

Roes, R., & Pint, K. (2017). The visual essay and the place of artistic research in the humanities. *Palgrave Communications*, *3*(8), 1–7. https://doi.org/10.1057/s41599-017-0004-5

Rorrison, D. (2010). Assessment of the practicum in teacher education: Advocating for the student teacher and questioning the gatekeepers. *Educational Studies*, *36*(5), 505–519. doi:10.1080/03055691003729013

Sangvanich, K., & Chinokul, S. (2018). Reflective sketchbook journals for art education students in Thailand. *International Journal of Education Through Art*, *14*(3), 319–337.

Serafini, F. (2014). *Reading the visual: An introduction to teaching multimodal literacy*. Teachers College Press.

Sprague, M., & Percy, R. P. (2014). The immediate and long-term impact of practicum experiences on students. *Journal of Public Affairs Education*, *20*(1), 91–111. http://www.jstor.org/stable/24369693

Springgay, S., Irwin, R. L., & Kind, S. W. (2005). A/r/tography as living inquiry through art and text. *Qualitative Inquiry*, *11*(6), 897–912. https://doi.org/10.1177/1077800405280696

Steen, G. J. (2018). *Visual metaphor: Structure and process*. John Benjamins Publishing Company.

Teenagers by My Chemical Romance. Songfacts. https://www.songfacts.com/facts/my-chemical-romance/teenagers (n.d.).

Thornton, A. (2005). The artist teacher as reflective practitioner. *International Journal of Art & Design Education*, *24*(2), 166–174. doi:10.1111/j.1476-8070.2005.00437

Thornton, A. (2013). *Artist, researcher, teacher: A study of professional identity in art and education*. Intellect Books.

Ulvik, M., Helleve, I., & Smith, K. (2018). What and how student teachers learn during their practicum as a foundation for further professional development. *Professional Development in Education, 44*(5), 638–649. https://doi.org/10.1080/19415257.2017.1388271

Vella, R. (2016). *Artist-teachers in context*. Sense Publishers.

J. Batič: An Insight Into the Practical Training of Fine Art Student Teachers in Slovenia Through Their Visual and Multimodal Reflections

601

Zupančič, T. (2020). The creative artistic portfolio and reporting by art education students on their student teaching. *Revija za elementarno izobraževanje*, *13*(1), 19–40.

ORFF-SCHULWERK, KODÁLY, DALCROZE AND WILLEMS IN SLOVENIAN MUSIC SCHOOLS

JERNEJA ŽNIDARŠIČ, NIKITA SENGER
University of Maribor, Faculty of Education, Maribor, Slovenia
jerneja.znidarisc@um.si, nikita.senger@gmail.com

Through our research, we aimed to determine a number of factors relating to the implementation of the Orff-Schulwerk, Kodály, Dalcroze, and Willems approaches and methods in the subject Music Theory in public and private music schools in Slovenia. The factors we investigated are:fprevalence of familiarity with the outlined methods, frequency of implementation, views on perceived effects, and obstacles in incorporating them. The study involved 51 teachers. The research results indicate that teachers are most familiar with the Orff-Schulwerk approach and the Willems method, which they also most frequently integrate into the teaching process. Teachers recognize that these approaches and methods offer the most in terms of holistic development. Teachers identify the obstacles in incorporating these approaches and methods as: insufficient familiarity with each approach, lack of didactic materials, time constraints, classroom size, existing curriculum, and large groups of students.

University of Maribor Press

ORFF-SCHULWERK, KODÁLY, DALCROZE IN WILLEMS V SLOVENSKIH GLASBENIH ŠOLAH

JERNEJA ŽNIDARŠIČ, NIKITA SENGER
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
jerneja.znidarisc@um.si, nikita.senger@gmail.com

Z raziskavo smo želeli ugotoviti razširjenost poznavanja, pogostost uporabe, mnenje o doprinosu in ovirah pri vključevanju glasbenih pristopov in metod Orff-Schulwerk, Kodaly, Dalcroze and Willems med slovenskimi učitelji predmeta Nauk o glasbi v javnih in zasebnih glasbenih šolah. V raziskavi je sodelovalo 51 učiteljev. Rezultati raziskave kažejo, da so učitelji v največji meri seznanjeni s pristopom Orff-Schulwerk in metodo Willems, katere tudi najpogosteje vključujejo v učni proces. Učitelji največji doprinos pristopov in metod prepoznavajo v celostnem razvoju. Ovire pri vključevanju pristopov in metod učitelji prepoznavajo v prešibkem poznavanju posameznega pristopa, pomanjkanju didaktičnega materiala, pomanjkanju časa, velikosti učilnic, obstoječem učnem načrtu in prevelikih skupinah učencev.

Univerzitetna založba
Univerze v Mariboru

1   Introduction

Music Theory is a mandatory subject in every public music school in Slovenia, which students attend alongside instrumental or vocal lessons. Basic activities include solfeggio (rhythmic and melodic training, sight-singing, the ability to analyze and understand musical theoretical and structural elements), performance and interpretation of musical literature, creation, and listening. The aim of these activities is to foster musical theoretical and structural knowledge. The Music Theory curriculum sets out the general objectives of the subject, which include the following: the development of musical perception and analytical perception; experiential-analytical listening; group and individual musical skills; knowledge of musical elements, literature, theoretical principles, and principles of aesthetic design; development of musical taste based on aesthetics; the ability to create musical content; knowledge of musical form: and contemporary music technology (Curriculum. Music Theory, 2022). In private music schools, Music Theory is not a mandatory part of the curriculum; the minimum requirement for its carrying out is the teaching of at least three orchestral instruments (Music School Law, 2000). Nevertheless, most Slovenian private music schools offer this subject, albeit in various ways, according to the institution's vision and objectives. In this context, it is important for teachers, whether in public or private schools, to be familiar with a variety of didactic approaches that can enrich and enhance the teaching process. In this regard, we focus on four approaches or methods developed by the following figures: Orff-Schulwerk (Carl Orff), Kodály (Zoltán Kodály), Dalcroze (Jaques-Dalcroze), and Willems (Edgar Willems). Each of these methods and approaches is informed by a unique philosophy and pedagogical approach. The Orff-Schulwerk approach foregrounds a physical experience with rhythm, beat, meter, and tempo using specially designed instruments. The Kodály method, a pedagogical system employed in Hungarian schools, combines elements of folk music, national culture, and contemporary music. Dalcroze emphasises a multidimensional approach to music, with learning taking place through a combination of basic musical elements such as rhythm, melody, and harmony with body movement (Collins, 2013). The Willems method is based on real-life experience with various properties of sound, rhythm, melody, rudimentary harmony (both classical and modern), singing, songs, and physical movement (Federation Internationale Willems, 2023).

These approaches and methods have also been the subject of scholarly discussion in recent decades. Existing research indicates the positive effects of implementing the Orff-Schulwerk approach, where the authors, among other things, point out that Orff-Schulwerk activities can provide children with optimal experiences and flow states in music education classes (Cunha & Carvalho, 2011). These activities lead to the faster attainment of goals, better test results, increased focus, mutual attention, and improved thinking and reasoning abilities (Debeljak, 2017). Furthermore, this approach also strengthens the connection between theory and practice and improves the work environment (Morin, n.d.).

A Chinese study by Wei (2022) established a connection between the Kodály method and deeper music perception, while Narkwong (2000) found that students developed quicker sight-reading, singing, and vocal technique. Crumpler (1982) further discovered that the Dalcroze approach significantly impacts the melodic growth and ear development of first graders. Similarly, Carvalho (2013) ascertained that children developed both motor and rhythmic abilities through the implementation of this approach. Studies by Joseph (1982), Rose (1995), and Blesedell (1991) emphasise that through the inclusion of the Dalcroze approach in the teaching process, children more rapidly acquired the ability to recognize and respond to specific rhythmic patterns, while also developing their rhythmic skills faster. Abril (2011) discovered that teaching music through movement influences the development of bodily awareness, deepening musical concepts, creativity, imagination, and improvisation. Denac and Vargazon (2017), on the other hand, investigated the development of auditory skills using the Willems method in children attending music introduction as part of preschool music education, or public kindergarten. They found that children exposed to the Willems method achieved the highest level of auditory development, followed by preschool music education children and then public kindergarten children. Skubic et al. (2021) conducted a study with an experimental group engaged in a six-month Willems method-based musical introduction and a control group, with the results demonstrating higher results in the experimental group compared to its control counterpart.

Our study aimed to determine the extent to which the Orff-Schulwerk, Kodály, Dalcroze, and Willems approaches and methods are present in Slovenian music schools (public and private), how familiar Music Theory teachers are with them,

whether they use them in their teaching, the potential contributions of each approach to the teaching process, and the perceived obstacles to their incorporation.

2 Approaches and methods

2.1 The Orff-Schulwerk approach

Goodkin (2004) defines Orff-Schulwerk as a modern incarnation of the ancient Greek ideal of "mousike," representing a synthesis of speech, music, and movement, with each of the elements interconnecting and mutually influencing each other. The music used and performed in Orff-Schulwerk is characterized as elementary, meaning it connects speech, singing, movement, and instrument playing, and is technically and creatively feasible at the child's level (Zalar, 2014). Therefore, the basis of the approach comprises three main activities: speech, movement, and musical creation, all derived through children's play. Singing serves as the primary instrument in the music classroom and unfolds in three stages: exploration, improvisation, and mastery. The exploration phase fosters understanding of the difference between speech and singing, expanding the tonal range, developing a repertoire of songs, building vocal confidence, familiarising learners with modal melodies, ostinato, polyphonic singing, and more. The improvisation segment provides students with an opportunity for personal exploration, thinking, connecting, meaningful creation, expanding imagination, and ultimately leads to the mastery phase, during which students repeat melodies, phrases, develop the ability to notate melodic dictation, and create independent compositions.

Before playing instruments, students employ sound gestures, which are then substituted initially by rhythmic and subsequently by rhythmic-melodic Orff instruments[1]. In the Orff-Schulwerk approach, students learn musical notation last. According to Orff, most musical creation should originate from auditory perception. Learning notation occurs through melodic instruments, often xylophones or soprano recorders, as instruments provide a clearer visualization of the relationships in music theory (Frazee, 2006). Students can play individually or in pairs, with group music-making being the central activity. This helps develop the ability for mutual

---

[1] The term Orff instruments or Orff instrumentarium refers to the instruments designed by Carl Orff for the purposes of his approach to music education. The reasons for modifying the instruments lie in their size and the inaccessibility of classical instruments, as well as the more complex playing techniques they require (Borota, 2013).

listening, following, and ultimately enhances students' musical communication (Zalar, 2014).

2.2 Kodály method

As the foundation of musical education, Kodály proposes teaching monophonic folk songs (Lierse, 2010), through which students become acquainted with musical elements. Additionally, the method encourages active student participation, primarily through singing and listening to music, aiming to develop musical sense (Dobszay, 2009). The basis of musical education is the Sol-fa system or relative solmization, which relies on solmization syllables used in exercises through abbreviations or the initial letters of the syllables (d, r, m, f, s, l, t). The cornerstone of this system is the "movable DO." Solmization syllables do not represent absolute pitch, like a musical alphabet, but rather represent scale degrees. Regardless of tonality or modulation into a different key, the tonic degree is named DO, while the others follow in sequence according to the solmization syllables (Weidenaar, 2006). Closely tied to the Sol-fa system is the concept of "mnemonic" (indicating pitch levels with body parts), where Kodály, with minor differences, adopts John Curwen's 19th-century concept (Szőnyi, 1974). In addition to indicating pitch levels, Kodály adds indications for modulation (Hribar, 2013). In the Kodály method, rhythmic education begins with simple stepping, which is then expanded, for instance, by emphasizing accented beats (Howard, 1996). The naming system for rhythmic syllables that Kodály adopted is based on the French Chevé method, while similarities with the Takadimi system[2] are also observed. Hungarian music education is rooted in the method developed by Kodály, spanning from preschool, primary and secondary school education to university-level instruction (Szőnyi, 1974).

2.1 Dalcroze approach

The main aim of the Dalcroze approach is to develop an inner musical ear for reading and writing music notation without the aid of an instrument, and to connect the entire body with the mind (Juntunen, 2016). The approach highlights four interconnected fundamental areas: "la rhythmique" (rhythm), "le solfège" (solfeggio), "l'improvisation" (improvisation), and "plastique animée" (Juntunen,

---

[2] Rhythm-pedagogy is a system that is based on research, learning theory, and best practice methods. It can be used with all age levels and across general, choral, and instrumental music (Ester, Scheib & Inks, 2006).

2004). The foundational basis for musical education is the cultivation of a sense of rhythm, which students internalize and connect with their whole body (Anderson, 2011). Movement always accompanies music, which is played or performed by the teacher (Juntunen, 2004). A significant or predominant aspect of the approach is eurhythmics, often referred to as Dalcroze eurhythmics (Altenmüller & Scholz, 2016). Eurhythmics is described as "... a spiritual-mental exercise, an art of movement that is not dance. The soul speaks to the body through movement and unites mental, spiritual, and bodily attributes into a harmonious whole." (Curriculum. Waldorf Elementary School Program, n.d., p. 2) Dalcroze (1930) noted that eurhythmics does not follow aesthetics but the body itself. It awakens muscular sensitivity and balances the relationship between the human body and the mind. When rhythm takes hold of the student, it spontaneously guides them to move to the music, which should be natural and free (Juntunen, 2016). In this context, eurhythmics is not methodical in the sense of following specific instructions or rules for movement (Habron, 2016).

In addition to the elements of rhythm, solfeggio, and improvisation, the Dalcroze approach also incorporates the field of "Plastique animée." This involves embodying music through movement, enabling balanced and controlled motion that expresses a natural, expressive, and spontaneous response to music or sounds. Through dance, gymnastics, and athletic exercises, "plastique animée" is acquired, which then leads to expressive musical interpretation (Juntunen, 2004; 2016).

2.1 The Willems method

This method is based on four fundamental principles: the close interconnectedness of human beings, music, and the cosmos; consideration, awareness, and respect for natural order and existing laws in hierarchy; the use of didactic activities that encompass all musical elements; and guiding musical development in a manner similar to the development of a mother tongue (Characteristics of the Willems Approach, n.d.). The connection between physical, emotional, and mental expressions is frequently observed through a review of literature, such as the division of individuals into physical, emotional, and mental aspects (Cozzutti et al., 2014), linking musical parameters with physiological, affective, and mental life (Damaceno, 1990; Frega, 1995), and the three areas of hearing that encompass auditory sensibility, auditory affectivity, and auditory intelligence (Carlow, 2015). Education

according to the Willems method takes place in two stages: Introduction to Music and Music Education. Introduction to Music encompasses four teaching areas: auditory perception, rhythm education, singing songs, and natural bodily movement (Tomac Calligaris, n.d.). In the Music Education stage, the fundamental areas are music theory and solfeggio, where students build upon their prior knowledge acquired in music introduction. Lessons must also include auditory perception education, rhythm education, singing songs, and natural bodily movement. Significant emphasis is placed on reading musical content as well as improvisation (Tomac Calligaris, n.d.). Willems defines the singing of songs as a crucial element of music education, through which we come to understand theory and musical elements. With singing, a child masters the ability to sing accurately, at which point they can be introduced to solfeggio (Cvetko, 2016).

3   Research

Research questions:

1. To what extent are teachers familiar with the individual methods and approaches of Dalcroze, Kodály, Orff-Schulwerk, and Willems?
2. Which approach or method (Dalcroze, Kodály, Orff-Schulwerk, and Willems) do teachers implement in their work and to what extent?
    2.1 Are there differences in the frequencies of the implementation of the approaches and methods (Dalcroze, Kodály, Orff-Schulwerk, and Willems) among teachers based on the type of music school where they teach (public/private)?
    2.2 Are there differences in the frequency of the implementation of the approaches and methods (Dalcroze, Kodály, Orff-Schulwerk, and Willems) among teachers based on their study program?
3. According to teachers, what effect does the implementation of approaches and methods (Dalcroze, Kodály, Orff-Schulwerk, and Willems) have on students, if any?
4. Do teachers identify obstacles in implementing the approaches and methods under study (Dalcroze, Kodály, Orff-Schulwerk, and Willems) into their teaching?

3.1 Research sample

The study includes 51 teachers who teach the subject Music Theory in Slovenian music schools. The participants represent a non-random convenience sample. Two individuals who only answered demographic questions and then discontinued responding to the questionnaire were excluded from the study. The number varies for each question due to incomplete questionnaires or interruptions during the questionnaire completion. The sample differs based on the type of music school where the teachers are employed (public music school: N=37; private music school: N=14) and the study program they have completed or are completing. The majority of teachers attended/are attending the music pedagogy study program (88.2%), followed by music art (5.9%), and other study programs (5.9%). Under "other study programs," respondents listed composition - pedagogical direction, Willems pedagogical diploma, and concurrent study of music pedagogy and music art. No teacher selected the musicology study program.

3.2 Data Collection Procedure

Data was collected through an online questionnaire (1ka), which was sent to all Slovenian music schools via email on November 18, 2022. The survey questionnaire was active from November 12, 2022, to February 6, 2023. The initial section of the questionnaire includes objective questions about the type of music school where the individual teaches and the type of completed or ongoing study program. Subsequent questions are related to familiarity, usage, and contributions of teaching approaches and methods in music education.

3.3 Data Processing Procedure

The data are presented in tables (absolute (f) and percentage (f %) frequencies). To gauge statistically significant differences between dependent ordinal and independent categorical variables, we used the Mann-Whitney U test.

3.4 Research Results

The results are presented in sections that correspond to the research questions.

Teachers' Familiarity with Individual Approaches or Methods

Teachers' Familiarity with the Orff-Schulwerk Approach

Table 1: Numbers (f) and structural percentages (f %) of teacher's familiarity with the Orff-Schulwerk approach.

Familiarity	F	f %
Not at all familiar	3	5,9
Slightly familiar	5	9,8
Moderately familiar	22	43,1
Very familiar	16	31,4
Extremely familiar	5	9,8
Total	51	100,0
M = 3,29, SD = 0,986		

Most teachers are neither familiar nor unfamiliar with the Orff-Schulwerk approach (43.1%; M=3.29). They are followed by teachers who are very familiar with Orff-Schulwerk (31.4%), then teachers who are slightly familiar with this approach (9.8%), and, lastly, teachers who are extremely familiar with it (9.8%). The fewest teachers (5.9%) are moderately familiar with the approach.

Teachers' Familiarity with the Kodaly method

Table 2: Numbers (f) and structural percentages (f %) of teacher's familiarity with the Kodály method.

Familiarity	f	f %
Not at all familiar	6	14,0
Slightly familiar	10	23,2
Moderately familiar	19	44,2
Very familiar	7	16,3
Extremely familiar	1	2,3
Total	43	100
M = 2,70, SD = 0,989		

The majority of teachers are moderately familiar with the Kodály method (44.2%; M = 2.71). They are followed by teachers who are slightly familiar with it (23.2%), teachers who are very familiar (16.3%), and teachers who are not familiar with the approach at all (14.0%). Only one teacher is extremely familiar with it (2.3%).

Teachers' Familiarity with the Dalcroze approach

Table 3: Numbers (f) and structural percentages (f %) of teacher's familiarity with the
Dalcroze approach

Familiarity	f	f %
Not at all familiar	16	39,0
Slightly familiar	16	39,0
Moderately familiar	6	14,6
Very familiar	3	7,3
Extremely familiar	0	0,0
Total	41	100
M = 2,00, SD = 0,917		

Most of the teachers are not at all familiar (39.0%), or slightly familiar (39.0%) with
the Dalcroze approach (39.0%). None of the teachers are extremely familiar with
the approach (0.0%), while some are moderately (14,6%) and very familiar with it
(7.3%).

Teachers' Familiarity with the Willems method

Table 4: Numbers (f) and structural percentages (f %) of teacher's familiarity with the
Willems approach

Familiarity	F	f %
Not at all familiar	0	0,0
Slightly familiar	3	7,3
Moderately familiar	12	29,3
Very familiar	11	26,8
Extremely familiar	15	36,6
Total	41	100
M = 4,00, SD = 0,985		

The majority of teachers are extremely familiar with the Willems method (36.6%).
They are followed by teachers who are moderately familiar (29.3%) and very familiar
(26.8%) with it. The fewest teachers are slightly familiar (7.3%), while no teacher is
not at all familiar with the method.

Implementation of the Individual Approaches or Methods in teaching

Teachers who were moderately, very, or extremely familiar with these approaches
and methods responded to questions about their incorporation into teaching. The
results showed that approximately half of the teachers (f=25; f%=58.1) incorporate

the Orff-Schulwerk approach into their teaching, while the majority of teachers (f=23; f%=85.2) do not include the Kodály method in their teaching, and most teachers (f=5; f%=55.6) do not include the Dalcroze approach in their teaching. Furthermore, the results revealed that all the teachers who received training related to the Willems method (f=14; f%=36) include it in their instructional process. Among a total of 38 teachers, 24 had not undergone any training (f%=63.2). The following results provide information about the frequency of implementation of these approaches or methods. Due to the limited sample size, further analyses of the frequency of the Dalcroze approach, the Kodály method and the Willems method based on the type of music school and study program are omitted.

Frequency of implementing the Orff-Schulwerk Approach

Table 5: Numbers (f) and structural percentages (f %) of teachers regarding the frequency of implementing the Orff-Schulwerk approach.

Frequency	F	f %
Never	0	0,0
Rarely	6	31,6
Occasionally	10	52,6
Frequently	3	15,8
Always	0	0,0
Total	19	100
M = 2,84, SD = 0,688		

At this point, 6 teachers discontinued the questionnaire. The majority of teachers (52.6%) occasionally implement the Orff-Schulwerk approach, which is also confirmed by the arithmetic mean (M = 2.84). The fewest teachers (15.8%) include the approach frequently. When asked about the elements of the approach they use, teachers predominantly responded that they use Orff instruments, mainly for accompaniment and performing simpler compositions. Some also mentioned incorporating movement and improvisation.

The result of the Mann-Whitney test did not indicate a statistically significant difference in the frequency of incorporating the Orff-Schulwerk approach according to the type of music school where teachers teach Music Theory (p = 0.660). For our sample, we observe that teachers, regardless of the type of music school, similarly frequently include the Orff-Schulwerk approach in their teaching.

Table 6: Numbers (f) and structural percentages (f %) of teachers regarding the frequency of implementing the Orff-Schulwerk approach based on the type of music school.

	Type of music school	$\overline{R}$	U	p
Frequency of implementation	Public	9,82	14,000	0,660
	Private	11,50		

Table 7: Numbers (f) and structural percentages (f %) of teachers regarding the frequency of implementing the Orff-Schulwerk approach based on the study program.

	Study program	$\overline{R}$	U	p
Frequency of implementation	Music pedagogy	9,82	14,000	0,660
	Other study programmes	11,50		

The result of the Mann-Whitney test did not demonstrate a statistically significant difference in the frequency of implementing the Orff-Schulwerk approach for the subject Music Theory based on the study program of teachers (p = 0.660). For our sample, we observe that teachers, regardless of the study program, similarly frequently include the approach.

Frequency of implementing the Kodály Method

Table 8: Numbers (f) and structural percentages (f %) of teachers regarding the frequency of implementing the Kodály method.

Frequency	f	f %
Never	0	0,0
Rarely	0	0,0
Occasionally	3	100
Frequently	0	0,0
Always	0	0,0
Total	3	100
M = 3,00 SD = 0,000		

All teachers who are implementing the Kodály method into their teaching do so occasionally. The elements of the approach they use include movement to music, phonemic awareness, and melodic dictation.

Frequency of implementing the Willems Method

Table 9: Numbers (f) and structural percentages (f %) of teachers regarding the frequency of implementing the Willems method into their teaching.

Frequency	f	f %
Never	1	7,1
Rarely	0	0,0
Occasionally	0	0,0
Frequently	1	7,1
Always	12	85,7
Total	14	100,0
M = 5,00, SD = 1,082		

The majority of teachers (85.7%) always include the Willems method in their teaching. One teacher includes it frequently (7.1%), and one teacher includes it very rarely (7.1%). Most teachers mentioned that they incorporate all elements of the Willems method, as they conduct their entire teaching based upon it. Others mentioned the following elements: solfeggio, improvisation, singing with solmization, singing songs for learning intervals and chords, as well as exercises for ear development.

Teachers' Views on the Perceived Effects of Various Approaches or Methods to Students' Development in Different Areas

Teachers who incorporate these approaches or methods into their teaching provided their views on the perceived effect of each approach or method to their students' development in different areas. They marked three areas (listed areas: holistic development, interpersonal relationships, self-confidence, creativity, motivation, aesthetic appreciation of music, musicality, rhythmic sense, melodic sense, theoretical knowledge, instrumental technique, vocal technique, rhythmic movement, improvisation ability, composition ability, other) in which they see the greatest perceived effects of each approach or method.

Perceived Effects of the Orff-Schulwerk Approach

19 teachers responded to the question on the perceived effects of the Orff-Schulwerk approach. The results show that teachers primarily see its contribution in improved creativity (57.9%) and motivation (47.4%), while they see the smallest or

zero contribution in vocal technique and composition ability (0.0%). Under the "other" category, they mentioned that the perceived effect of implementing this method is evident in all of the listed areas, as well as chamber playing ability, and simple song accompaniment.

Perceived Effects of the Kodály Method

Three teachers responded to the question about the perceived effects of using the Kodály method. Each of them marked three areas where they believe the method has the greatest effect. The results indicate that teachers perceive its effects on holistic development, self-confidence, creativity, motivation, aesthetic appreciation of music, melodic sense, and theoretical knowledge.

Perceived Effects of the Dalcroze Approach

Four teachers responded to the question on perceived effects of the Dalcroze approach. Each of them marked three areas where they believe the approach was most effective. The results show that teachers primarily see its contribution in holistic development (75.0%) and rhythmic movement (75.0%). They also marked motivation, musicality, rhythmic and melodic sense, and improvisation ability.

Perceived Effects of the Willems Method

14 teachers responded to the question on the perceived effects of the Willems method. Each of them marked three areas where they believe the method is most effective. The results indicate that teachers primarily see its contribution in holistic development (85.7%), melodic sense (64.3%), and creativity (57.1%). They do not see a contribution in instrumental and vocal technique (0.0%).

Obstacles in Implementing individual Approaches and Methods in Teaching

This question pertains to the recognition of obstacles in implementing approaches or methods and was intended for teachers who are moderately, very, or extremely familiar with the Orff-Schulwerk approach.

Obstacles in Implementing the Orff-Schulwerk Approach

Table 10: Numbers (f) and structural percentages (f %) of teachers regarding the recognition of obstacles in implementing the Orff-Schulwerk approach.

Obstacle recognition	f	f (%)
Yes	16	45,7 %
No	19	54,3 %
Total	35	100,0 %

At this point, two individuals discontinued the survey. Slightly more than half of the teachers (54.3%) questioned do not recognize obstacles when using the Orff-Schulwerk approach. Teachers who do (45.7%) reported the following obstacles: lack of didactic materials and Orff instruments, and primarily, a shortage of time.

Obstacles in Implementing the Kodály Method

Table 11: Numbers (f) and structural percentages (f %) of teachers regarding the recognition of obstacles in implementing the Kodály method.

Obstacle recognition	f	f (%)
Yes	9	34,6
No	17	65,4
Total	26	100

The majority of teachers do not perceive obstacles when incorporating the Kodály methods (65.4%). Teachers who do recognize obstacles in using the method (34.6%) reported the following: lack of knowledge about the method, different teaching principles, and insufficient space for free movement.

Obstacles in implementing the Dalcroze Approach

Table 12: Numbers (f) and structural percentages (f %) of teachers regarding the recognition of obstacles in implementing the Dalcroze approach.

Obstacle recognition	f	f (%)
Yes	1	11,1
No	8	88,9
Total	9	100

The majority of teachers do not perceive any obstacles when using the Dalcroze approach (88.9%). The teachers who do recognize them mentioned insufficient familiarity with the approach as the reason.

Obstacles in implementing the Willems method

Table 13: Numbers (f) and structural percentages (f %) of teachers regarding the recognition of obstacles in implementing the Willems approach.

Obstacle recognition	f	f (%)
Yes	7	18,4
No	31	81,6
Total	38	100

The majority of teachers do not recognize obstacles when using the Willems method (81.6%). Teachers who do (18.4%) reported the following obstacles: insufficient familiarity with the method, current curriculum, large student groups, and instructional materials.

4   Discussion

The results of our research indicate that teachers in Slovenian music schools specialising in Music Education are most familiar with the Orff-Schulwerk approach and the Willems method. Teachers are less familiar with the Kodály method and the Dalcroze approach. It is worth noting that in Slovenia, organizations such as the Slovenian Society of Carl Orff (n.d) and the Slovenian Society for Willems Music Pedagogy (n.d.) operate, aiming to demonstrate the value of these approaches and methods and promote their utility through activities and professional development for teachers and educators. Besides these organizations, private music schools also operate based on the Willems method, such as the Edgar Willems Music Center (n.d.), Do Re Mi Music Center (n.d.), Melodija Music Center (n.d.), among others, which certainly contributes to teachers' familiarity. In Slovenia, there is no identified association or society specifically grounded in the Kodály method. However, individual seminars and symposiums have been organized to introduce educators to the principles of the method (Kodály seminar, Music Matice Ljubljana, 2017; "Kodály moves to Maribor" - Teaching music with Zoltán Kodály's method, Faculty of Education Maribor, 2019), although these are not associated with a specific Slovenian organization centered on the Kodály approach.

Given the results regarding familiarity with the approaches and methods, it is not surprising that teachers most frequently incorporate the Willems method and the Orff-Schulwerk approach into their teaching. Orff-Schulwerk is more frequently integrated by teachers in public music schools, albeit less frequently than by teachers in private music schools. This implies that teachers in private music schools who integrate the approach invest more effort into its application and integration into their teaching. All teachers who have received training in the Willems method incorporate it into their teaching, and most do so always, meaning on a weekly basis. According to data from 2020, the most frequently used method in music education is the Willems method (Jovanović & Crvenica, 2020). Vnučec (2009) found that the main reasons for choosing to implement the Willems method are the organized and systematic nature of instruction and the greater and faster progress in the musical and holistic development of the child. While the Kodály method and Dalcroze approach are not commonly integrated by most teachers, they do not perceive significant obstacles to their inclusion. Among those who recognize obstacles, the primary reasons cited are insufficient familiarity with the approach (Kodály, Dalcroze, Willems), lack of didactic materials (Orff-Schulwerk, Willems), lack of time (Orff-Schulwerk), lack of space for movement (Kodály), the current curriculum, and large student groups (Willems).

Teachers perceive the effects of the methods and approaches in similar domains. For the Orff-Schulwerk approach, teachers primarily recognise its contributions in creativity, motivation, and interpersonal relationships. Other research on the Orff-Schulwerk approach also highlights its positive impact on aspects such as active listening, communication, concentration, and attention (Debeljak, 2017; Kayili & Kuscu, 2020; Morin, n.d.; Wang et al., 2022). Concerning the Kodály method, teachers identify contributions across various domains, primarily in melodic perception and holistic development. A study by Wang et al. (2022) also demonstrates that the use of the Kodály method leads to faster development of students' rhythmic perception. For the Dalcroze approach, teachers emphasise its contribution in rhythmic movement and holistic development. Research by the authors Rose (1995), Blesedell (1991), Crumpler (1982), and Carvalho (2013) also highlights the positive effects on rhythmic and melodic perception and rhythmic movement. The studies by Pretorius and Merwe (2019; 2020), which were conducted with the same assumptions but in different countries - South Africa and Sweden, respectively - are particularly interesting. The aim of the study was to

explore the impact of the Dalcroze approach on choir conducting. The studies found that the approach positively influenced collective learning and contributed to a sense of group affiliation. In our research, teachers predominantly highlighted the contributions of the Willems method in the domains of holistic development, creativity, and melodic perception. Similar findings can be observed in other studies, where authors suggest that the Willems method impacts the development of children's musical perception (Denac and Vargazon, 2017) and contributes to their overall musical skill development (Skubic et al., 2021).

5   Conclusion

The research results have demonstrated that teachers in Slovenian music schools are most familiar with the Orff-Schulwerk approach and the Willems method, while their familiarity with the Jacques-Dalcroze method is relatively lower. This familiarity is also associated with the frequency of incorporating these approaches and methods into teaching. Interestingly, the majority of teachers do not perceive obstacles in implementing the Kodály and Dalcroze approach into the teaching process. We speculate that this lack of recognition of obstacles might stem from unfamiliarity with these concepts. This is also indicated by the responses of teachers who did recognize obstacles. Apart from insufficient familiarity with the approaches and methods, teachers mentioned obstacles related to the lack of didactic materials, time constraints, limited classroom space for movement, the current curriculum, and large student groups.

Across all approaches and methods, teachers recognize their contributions to holistic development. Creativity is emphasized in the Orff-Schulwerk approach and Willems method, rhythmic movement in Dalcroze, and melodic perception in the Kodály and Willems methods. Most teachers do not see significant contributions in terms of vocal technique development, compositional abilities (except for Willems), and instrumental technique (except for Orff-Schulwerk).

The limitations of the research lie in the small sample size, which could potentially be expanded through sending out the questionnaire again or establishing direct contact with individual music school teachers. For a more precise understanding of the issues related to recognizing barriers in the use of methods and approaches, it would be beneficial to ask teachers about the reasons for not incorporating certain

methods or approaches into their teaching process. Additionally, it would be valuable to explore whether teachers would be willing to participate in further education on this topic.

References

Abril, C. R. (2011). Music, movement and learning. *The MENC handbook of research in music learning, (2),* 92–129.

Anderson, W. T. (2011). The Dalcroze approach to music education: theory and applications, *Journal of General Music Eduaction, 26*(1). https://doi.org/10.1177/10483713114289

Altenmüller, E. & Scholz, D. S. (2016). Émile Jaques-Dalcroze as a visionary pioneer of Neurologic Music Therapy. *Approaches: An Interdisciplinary Journal of Music Therapy 8*(2), 112–117.

Blesedell, D. S. (1991). A study of the effects of two types of movement instruction on the rhythm achievement and developmental rhythm aptitude of preschool children. [PhD]. Temple University.

Borota, B. (2013). *Glasbene dejavnosti in vsebine* [Musical Activities and Content]. Univerzitetna založba Annales.

Carlow, R. (2015). Book Review: Edgar Willems. Psychological foundations of Music Education. *Journal of Historical Research in Music Education, 37*(1), 94–99.

Carvalho, S. (2013). The influence of the Dalcroze's eurhythmics in instrumental practice: A case study. https://core.ac.uk/download/pdf/228140919

Characteristics of the Willems Approach (n.d.). Edgar Willems Music Centre (GCEW, Institute). https://willems.si/zivljenjepis/znacilnosti-willemsovega-pristopa/

Collins, I. H. (2013). *Dictionary of music education.* Scarecrow.

Cozzutti, G., Blessano, E., & Romero-Naranjo, F. J. (2014). Music, Rhythm and movement: A comparative study between the BAPNE and Willems Methods. *Procedia – Social and Behavioral Sciences, 152*, 13–18.

Crumpler, S. E. (1982). *The effects of Dalcroze Eurhythmics on the melodic musical growth of first grade students.* [PhD.]. Louisiana State University.

Cunha, J. C. R., & Carvahlo, S. (2011). Orff-Schulwerk approach and flow indicators in music education context: A preliminary study in Portugal, *International Journal of Arta & Sciences, 4*(21), 75-81.

Curriculum. Music Theory (2022). https://www.gov.si/assets/ministrstva/MVI/Dokumenti/Glasbena-sola/Ucni-nacrti/Posodobljeni-ucni-nacrti

Curriculum. Waldorf Elementary School Program. (n.d.) http://www.waldorf-maribor.si/application/files/4514/5125/8086/ucni_nacrt_devetletka.pdf

Cvetko, K. (2016). *Edgar Willems in slovensko glasbeno izobraževanje* [Edgar Willems and Slovenian music education]. [Master's Thesis]. University of Ljubljana, Faculty of Arts.

Dalcroze, J. (1930). *Eurhythmics art and education.* Chatto and Windus.

Damaceno, G. G. (1990). Personalities in World Music Education No.10. Edgar Willems. *International Journal of Music Education, 15*(1), 39–44.

Debeljak, M. (2017). *Interdisciplinary Integration of Music and Social Sciences through the 'Orff- Schulwerk' Approach* [Master's Thesis]. University of Ljubljana, Faculty of Education.

Denac, O., & Vargazon, H. (2017). Vpliv institucionalne glasbene vzgoje na raven razvitosti melodičnega in ritmičnega posluha 5-6 let starih otrok [The Impact of Institutional Music Education on the Development of Melodic and Rhythmic Listening Skills in 5-6-Year-Old Children]. *The Journal of Music Education of the Academy of Music in Ljubljana*, 13(27),163–174.

Do Re Mi Music Center (n.d.) https://www.doremi.si/

Dobszay L. (2009). *After Kodaly, Reflection on Music Education*. Kodaly Institute of Liszt Academy.

Edgar Willems Music Center (n.d.). https://willems.si/

Émile Jaques-Dalcroze – Solfeggio (2018). Vloga improvizacije pri slušni zaznavi ter slušna zaznava in improvizacija pri instrumentu, seminar [The role of improvisation in auditory perception and auditory perception and improvisation in an instrument, the seminar]. Akademija za glasbo, Univerza v Ljubljani.

Don P., Scheib, J. W., & Kimberly J. (2006). Takadimi: A Rhythm System for All AgesEster. *Music Educators Journal, 93*(2), 60-65.

Federation Internationale Willems (2003). https://fi-willems.org/training-courses-en/pedagogy-en/

Frazee, J. (2006). *Orff Schulwerk Today: nurturing musical expression and understanding*. Mainz.

Frega, A. L. (1995). A Comparison of the Teaching Strategies of Maurice Martenot and Edgar Willems: Conclusions and Implications for Future Research. *Bulletin of the Council for Research in Music Education, 127*, 63–71.

Goodkin, D. (2004). *Play, sing & dance: an introduction to Orff Schulwerk*. Mainz.

Habron, J. (2016). Dalcroze Eurhythmics in music therapy and special music education. *Approaches: An Interdisciplinary Journal of Music Therapy 8*(2), 100–103.

Hribar, N. (2013). *Glasbeno opismenjevanje v enoglasnem otroškem pevskem zboru* [Glasbeno opismenjevanje v enoglasnem otroškem pevskem zboru] [Master's Thesis]. University of Ljubljana, Faculty of Education.

Howard, P. M. (1996). Kodaly Strategies for Instrumental Teachers. *Music Educators Journal, 82*(5), 27–33.

Joseph, A. (1982). *A Dalcroze eurhythmics approach to music learning in kindergarten through rhythmic movement, ear-training and improvisation* [PhD]. Carnegie Mellon University.

Jovanović, M., & Crvenica, J. (2020). Comparative analysis of the curriculum for the subject solfeggio (ems) in slovenia, montenegro, croatia and serbia. *Facta Universitatis, Series: Visual Arts and Music*, 91-104. https://doi.org/10.22190/FUVAM1902091J

Juntunen, M. L. (2004). *Embodiment in Dalcroze Eurhythmics*. Oulu University.

Juntunen, M. L. (2016). The Dalcroze Approach: Experiencing and Knowing Music Through Embodied Exploration. In C. R Abril & B. Gault (Eds.) *Approaches to Teaching General Music: Methods, Issues, and Viewpoints* (p.141-167). Oxford University Press

Kayili, G., & Kuşcu, Ö. (2020). The effects of Orff-based attention-enhancing music education programme on impulsive preschool children's cognitive tempo. *Early Child Development and Care, 190*(3), 390-399.

Lierse, S. (2010). The Kodaly Method in the Twenty-first Century. *Bulletin of the Transilvania University of Brasov*, 3(52), 19–22.

Melodija Music Center (n.d.). https://www.gc-melodija.si/

Morin, F. (1996). *The Orff-Schulwerk Movement: A Case Study in Music Education Reform* [Ph.D]. University of Manitoba, Faculty of Education.

Music School Law (Zgla). (2000). Uradni list RS (nubmer 81/06). http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO2063

Narkwong, T. (2000). The Possibility of using the Kodaly Method to Teach Music Literacy in Thailand. *Journal of Humanities, 3*(2), 23–31.

Pretorius, M., & Merwe, L. (2019). 'Ritmik och kollektivt lärande': collective learning in a Swedish choir as a community of musical practice through Dalcroze-inspired activities, *Music Education Research, 21*(5), 582-595. https://doi.org/10.1080/14613808.2019.1665637

Pretorius, M., & Merwe, L. (2020). Learning Collectively in a South African High School Choir Community of Musical Practice through Dalcroze-Inspired Activities, *Muziki,(17)*1, 109-130. https://doi.org/10.1080/18125980.2020.1810109

Rose, S. E. (1995). *The effects of Dalcroze eurhythmics on beat competency performance skills of kindergarten, first-, and second-grade children* [PhD]. University of North Carolina.

Slovenian Society of Carl Orff (n.d.). https://slorff.weebly.com/

Slovenian Society for Willems Music Pedagogy (n.d.). https://slorff.weebly.com

Skubic, D., Gaberc, B., & Jerman, J. (2021). Supportive Development of Phonological Awareness Through Musical Activities According to Edgar Willems. *SAGE Open, 11(*2), 1–11.

Sogin, D. W., & Wang, C. C. (2008). Music activity reports by music teachers with varying training in Orff Schulwerk, *International Journal of Music Education,* (26)3, 269-278. https://doi.org/10.1177/0255761408092527

Szőnyi, E. (1974). *Kodály's Principles in Practice: An approach to Music Education through the Kodály Method.* Corvina Press.

Tomac Calligaris, M. (n.d.). Osnovno glasbeno izobraževanje po metodološkem sistemu Edgarja Willemsa [Basic music education according to Edgar's methodological system]. https://www.gov.si/assets/ministrstva/MVI/Dokumenti/Glasbena-sola/E_Willems_program.pdf

Vnučec, I. (2009). Nauk o glasbi in solfeggio po metodološkem sistemu Edgarja Willemsa [The teaching of music and solfeggio according to the methodological system of Edgar Willems] [Master's Thesis]. University in Maribor, Faculty of Education.

Wang, Y., Matvieieva, O., & Zheng, Q. (2022) Effectiveness of the Orff and Kodaly methods for the development of musical ability in preschool children compared to a standard curriculum. *Culture and Education, 34*(1), 14-38 https://doi.org/10.1080/11356405.2021.2006500

Wei, W. (2022). Kodaly Music Teaching Method Develops in Music Education in Local Colleges and Universities. *International Journal of Education and Humanities, 5*(2), 146–148.

Weidenaar, G. (2006). Solmization and the Norwich and Tonic Sol-Fa Systems. *The Choral Journal, 46*(9), 24–33.

Zalar, K. (2014). *Narativne in dialoške razsežnosti "Orff-Schulwerka* [The Narrative and Dialogic Dimensions of Orff-Schulwerk][PhD]. University of Ljubljana, Faculty of Education.

Students' Attitude Towards Creating Musical Content in Primary School

Špela Pučko,[1] Jerneja Žnidaršič[2]
[1] Danila Kumar Primary School, Ljubljana, Slovenia
puckos@os-danilekumar.si
[2] University of Maribor, Faculty of Education, Maribor, Slovenia
jerneja.znidarsic@um.si

Engaging in creativity in music offers the potential for enriching educational practices, with students taking an active role and experiencing music through practical activities. Creating one's own musical content fosters a lasting interest in music among students, where positive musical experiences play a crucial role in developing a positive attitude towards music education and a favourable perception of music even in adulthood. The fundamental purpose of the research was to examine the attitude of students ($N = 104$) towards creating musical content in the subject of Music Art in Slovenian primary school. The results indicate that activities connected with creating musical content are relatively popular among students, with improvisation and composing their own songs being the most favoured. Students perceive creating musical content as an enjoyable activity that makes them feel relaxed.

University of Maribor Press

ODNOS UČENCEV DO USTVARJANJA GLASBENIH VSEBIN V OSNOVNI ŠOLI

ŠPELA PUČKO,[1] JERNEJA ŽNIDARŠIČ[2]
[1] Osnovna šola Danile Kumar, Ljubljana, Slovenija
puckos@os-danilekumar.si
[2] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
jerneja.znidarsic@um.si

Ustvarjanje v glasbi nudi potencial za obogatitev učnih praks, pri čemer učenci prevzemajo aktivno vlogo in tako glasbo doživljajo skozi praktične izkušnje. Lastno ustvarjanje glasbenih vsebin spodbuja trajno zanimanje učencev za glasbo, pri čemer imajo pozitivne glasbene izkušnje ključno vlogo pri razvoju pozitivnega odnosa do pouka glasbene umetnosti in ugodnega dojemanja glasbe tudi v odrasli dobi. Temeljni namen raziskave je bil proučiti odnos učencev ($N = 104$) do dejavnosti ustvarjanja v glasbi pri predmetu Glasbena umetnost v slovenski osnovni šoli. Rezultati kažejo, da je ustvarjanje glasbenih vsebin med učenci dokaj priljubljeno, pri čemer sta najbolj priljubljeni dejavnosti improvizacija in ustvarjanje lastnih pesmi. Učenci ustvarjanje glasbenih vsebin doživljajo kot prijetne dejavnosti, ob katerih se počutijo sproščeno.

1 Introduction

Creativity, as a key 21st century competence (Menard, 2013; Bolden & DeLuca, 2022), is present in numerous domains, offering significant potential in the field of music in particular (Menard, 2015). Authors in the 1990s identified and affirmed the favourable impacts of musical creation, including cognitive, musical, and personality development in children (Gorder, 1980; Gordon, 1989; Webster, 1990; Baloche, 1994). Preschool children spontaneously begin to create music, either by composing songs, engaging in vocal improvisation (Sundin, 1997), or creating improvised or homemade instruments (Borota, 2013). A supportive and nurturing learning environment during primary school education plays a crucial role in the development of children's musical creativity, their individual interests, and internal motivation for engaging with music (Menard, 2013; Papageorgi & Economidou Stavrou, 2023).

Music education in primary school should facilitate the development of musical creativity in all students (Menard, 2013). As such, it should encompass the experiential activities of singing, playing instruments, listening to music, and musical creativity, encouraging students' experience and expression of music (Curriculum. Music Art, 2011) and fostering the development of students' musical abilities, skills, and knowledge (Sicherl-Kafol et al., 2011). Musical activities intertwine and complement each other, with musical creativity serving as the common thread, most prominently expressed thorough creativity in music (involves both interpretative performance and vocal and instrumental creation of musical content) and students expressing themselves through movement, visual arts, and words stimulated by music (Borota, 2013).

Several authors highlight improvisation and composition as the most comprehensive activities in musical creativity (Oblak, 2002; Burnard & Power, 2013; Pucihar, 2016), where both processes result in the creation of new musical content. Improvisation is described as an irreversible act (Biasutti, 2015), involving spontaneous music creation, while composition allows for continuous modification, correction, and thoughtful development of the musical product (Martinović Bogojević, 2021). The concept of composition has been part of the primary school curricula in England, Australia, Iceland, and the United States since the 1970s (Faulkner, 2003), while improvisation and composition are defined within the Slovenian Curriculum for Music Art (2011, p. 25) as part of creating and complementing musical content

(creating accompaniments, musical content and forms, and other forms of improvisation, with outcomes being sonic experiments). Creating musical content also involves making up musical content, the creation of melodies, songs, and rhythmic-melodic entities (Denac, 2012), allowing students to create their own music and engage in group musical activities with peers (Kokotsaki, 2016).

In the creation of musical content, collaborative engagement is often employed (Martinović Bogojević, 2021), which students perceive as enjoyable, effective, meaningful, and less challenging than if done individually (Faulkner, 2003). Collaborative music creation helps students generate more diverse musical ideas, which can emerge through socializing with peers in informal settings. Research by Kokotsaki and Hallam (2007) demonstrated that collaborative creation fosters a sense of group cooperation, providing individuals with a sense of significance and usefulness, as well as the opportunity to overcome challenges that lead to both individual and collective musical achievements.

The Students' Attitude Towards Creation of Musical Content

The students' attitude towards the creation of musical content is shaped by the concepts and theories they acquire from practical experience (Mihladiz et al., 2011), influencing students' motivation for learning music and the development of musical skills (Kokotsaki & Hallam, 2007). Students' interests, emotions, and values play a crucial role in determining their level of musical activity and the quality of musical knowledge (Sicherl-Kafol et al., 2011). Those students for whom music is already a significant value in everyday life attribute greater importance to music and are more motivated in music lessons (Button, 2006; Habe & Tandler, 2013).

Students perceive creating musical content as an interesting and beneficial musical activity (Odam, 2000; Leung, 2008), through which they acquire knowledge of rhythmic and melodic notation, emphasized by students as practical knowledge (Economidou Stavrou & Papageorgi, 2021). Students enjoy and are more motivated in creating musical content that is connected to their daily lives and emotions. In this way, students may view creating musical content as composing real compositions rather than merely a task required by the learning process (Leung, 2008). In Menard's study (2015), which focused on perceptions relating to creating musical content among students in two American high schools, students reported

confidence in their ability to create musical content. They believed they could write a good song and were not intimidated by the process of making music. Students were highly focused during the creative process as they were interested in the final product (Menard, 2015). Creating and realizing new musical content can also be accompanied by negative feelings, such as anxiety, self-doubt, and hesitation (Martinović Bogojević, 2021). Negative emotions during music creation may arise due to a lack of knowledge, as expressing musical ideas can be challenging for students (Menard, 2015). Negative emotions developed during education can influence the development of negative attitudes toward music education and the overall educational experience (Akman, 1992). Through creating their own music, students take on the role of composers (Menard, 2013), reinforcing acquired musical knowledge (Strand, 2006) and gaining positive and authentic learning experiences in music in primary school (Kokotsaki, 2016). Both positive and negative attitudes toward music education can influence an individual's perception of music even in adulthood (Temmerman, 1993; Kocabaş, 1997).

The students' attitude towards creation activities can also be influenced by the collaboration of schools and teachers with composers who guide students through the creative process (Sicherl-Kafol et al., 2011; Žnidaršič, 2022). In Slovenia, the SKUM project ran from 2017 to 2022, encouraging collaboration between schools and kindergartens, artists, and cultural artistic institutions (Kroflič et al., 2022). Participants in the project note that incorporating artistic experiences in music education positively affects several student-related factors: their perception, expression, learning, interpersonal relationships, and emotional expression. During artistic activities, students expressed satisfaction and self-confidence (Smrtnik Vitulić et al., 2022). Involving artists in musical projects within the learning process contributed to students rating musical events as interesting and enjoyable. They particularly enjoyed playing instruments, dancing, singing, and engaging in group musical creation (Rotar Pance, 2022).

Research on students' experiences and attitudes towards music education and music creation indicates that girls tend to be more inclined towards it than boys (Crowther & Durkin, 1982; Button, 2006; Leung, 2008; Kokotsaki, 2016). Attending music school as a voluntary activity and playing instruments can also foster a more positive attitude on the part of students towards music education (Eccles & Wingfield, 2002; Eldemir, 2006; McPherson & O'Neill, 2010). Meanwhile, students attending music

school bring a higher level of musical experience into the creative process (Menard, 2015) and have more confidence in their musical competencies and knowledge (Burnard, 1995). Leung (2008) observes that students who do not play instruments increased their motivation for creating musical content during the creative process. However, the results of the Slovenian study by Habe and Tandler (2013) showed an equal level of motivation for music education regardless of music school attendance.

Research involving Slovenian music teachers indicates that the least amount of time is devoted to creative activities in music education in primary schools (Črčinovič Rozman 2009; Traven, 2019; Martinovič Bogojević, 2021; Juhart et al., 2023). Slovenian third educational cycle[1] teachers include creative music activities the least in music education classes (Traven, 2019). Music teachers often struggle to find enough time for all the content that needs to be presented in class (Menard & Rosen, 2016). They face challenges such as feeling professionally unprepared to carry out creative music content activities, meet curriculum demands, as well as contend with large student numbers, and insufficient hours of music education (Martinovič Bogojević, 2021). Teachers also mention that creating musical content is not considered a meaningful activity in their classes (Strand, 2006), and students are most creatively productive only in the second educational cycle of primary school (Martinović Bogojević, 2021). The author believes that musical knowledge is necessary for creating musical content, leading to doubts about the feasibility, effectiveness, and practicality of such activities (there). Music teachers are unsure how to motivate their students to create musical content, which also hinders students' motivation for such activities (Leung, 2008). On the other hand, research indicates that third-cycle students are most favourable towards performing and creating activities (Juhart et al., 2023). Habe and Tandler (2013) found in their research that Slovenian primary school students have a high affinity for music education, and they also did not find differences in preferences for music education between students in the second educational cycle (5th and 6th grade) and third educational cycle (8th and 9th grade). Meanwhile, authors investigating the perception of the learning environment in different grade levels note that younger students perceive the classroom learning environment more positively than older students (Burnett, 2002; Papageorgi & Economidou Stavrou, 2023).

---

[1] The basic school programme in Slovenian primary school is divided into three educational cycles; each cycle covers three grades (Taštanoska, 2019).

We observe that in the Slovenian general education system, musically talented students are encouraged to gain experience in creating musical content through the Slovenian Music Olympiad (Rotar Pance & Igličar, 2017). However, there are gaps in implementing creative music activities in music education classes. Gaps can also be found in the analysis of literature on the study of students' attitudes towards activities connected with creating musical content in the Slovenian context. With this research, we aimed to determine students' attitudes towards creative activities in music education in Slovenian primary schools. We sought answers to the following questions: (1) whether activities connected with creating musical content are enjoyable for students in grades 6 to 9, (2) how do students in grades 6 to 9 perceive activities connected with creating musical content and (3) what are students' opinions regarding the actual implementation of activities connected with creating musical content?

2 Methods

2.1 Objectives and Research Questions

In the study, we investigated students' attitudes toward creative activities in music. More specifically, we explored the popularity and perception of different activities connected with creating musical content among students in grades 6 to 9, examining potential differences based on gender, grade level, and music school attendance.

The research questions were as follows:

1. Which music activities are more and less popular among students?
2. How popular are activities connected with creating musical content?
   2.1 Are there differences based on music school attendance?
   2.2 Are there differences based on the grade level of the students?
3. Which activities connected with creating musical content are more and less popular?
4. How do students perceive activities connected with creating musical content?
   4.1 Are there differences based on gender?
   4.2 Are there differences based on the grade level of the students?
   4.3 Are there differences based on music school attendance?

5. What are the opinions of students regarding the actual implementation of activities connected with creating musical content in the subject Music Art?

2.2 Research Methods

In the study, we employed a quantitative approach and a descriptive method, utilizing a causal non-experimental method of empirical research.

2.3 Research Sample

The non-random purposive research sample consisted of 104 primary school students (6th grade: $N = 12$, 7th grade: $N = 18$, 8th grade: $N = 29$, and 9th grade: $N = 45$) in central Slovenia, including 50 boys ($f\% = 48.08\%$) and 54 girls ($f\% = 51.92\%$). Within the research sample, 12 students attended music school ($f\% = 11.54\%$), while 92 students did not attend music school ($f\% = 88.46\%$).

2.4 Measuring Instruments

Data for the study were collected using a survey questionnaire consisting of 10 closed and open-ended questions and rating scales. Participants required approximately 10 minutes to complete the questionnaire. In the first part, we gathered demographic information about the students, including gender, grade level, and whether they attended music school. The second part included questions using a 5-point Likert scale, assessing the popularity and perception of creating musical content. The scale provided responses ranging from "dislike" to "like" and "strongly disagree" to "strongly agree". The reliability of the measurement instrument was assessed by calculating the Cronbach alpha coefficient. With a calculated value of $a = .91$, we confirmed the questionnaire's appropriate psychometric characteristics.

2.5 The Process of Collecting and Processing Data

After initial discussions with the administration of the central Slovenian primary school, the data collection process took place through surveys during music lessons between December 11th and 15th, 2023.

For data analysis, we used the JASP Statistics program and presented descriptive statistics in tables. To test the significance of differences between independent samples, we used the Mann-Whitney and Kruskal-Wallis tests, t-test, and the Chi-square test of independence hypothesis.

3   Results

3.1.   Popularity of Music Activities

Table 1: Frequency (*f*) and Structural Percentages (*f*%) of the Most and Least Popular Music Activities among Students.

Music activity	Most popular activity		Least popular activity	
	f	*f*%	*f*	*f*%
Singing	25	24,04 %	25	24,04 %
Playing instruments	36	34,62 %	7	6,73 %
Listening to music	34	32,69 %	4	3,85 %
Interpretative reproduction of musical content	2	1,92 %	9	8,65 %
Creating musical content	3	2,88 %	34	32,69 %
Creative activities stimulated by music	4	3,85 %	25	24,04 %
Total	104	100,00 %	104	100,00 %

Table 1 presents an analysis of responses to two questions in the survey questionnaire. We were interested in understanding which music activities are more and less popular among students during music lessons. In both questions, students could choose only one activity. The most enjoyable music activity is playing instruments (34.62%), followed by listening to music (32.69%) and singing (24.04%). A significant portion of students (32.69%) rated creating musical content as the least enjoyable music activity.

3.2   Popularity of Activities Connected with Creating Musical Content

Students evaluated the enjoyment of individual activities on a 5-point Likert scale. Students were undecided in their evaluations (neither dislike nor like) or, on average, rated them as fairly enjoyable ($2.99 < M < 3.54$). The most popular activities are improvisation ($M = 3.54$) and creating songs ($M = 3.42$).

Table 2: Descriptive Statistics (Mean, Standard Deviation) of Popularity of Activities Regarding Creating Musical Content Music.

Activities connected with creating musical content	Descriptive statistics		
	N	M	SD
Improvisation	104	3,54	1,11
Creating songs	104	3,42	1,15
Creating a melody to a given text	104	3,19	1,03
Creating a melody to a given rhythm	104	3,14	1,09
Creating a text to a given melody	104	3,05	1,14
Creating melody	104	3,03	1,11
Creating rhythm	104	3,02	1,09
Creating rhythmic and melodic accompaniment	104	2,99	1,09

Table 3: Descriptive Statistics (Mean, Standard Deviation) and Mann-Whitney Test for Differences in the Popularity of Activities Connected with Creating Musical Content, based on Music School Attendance.

Popularity of activities connected with creating musical content	Descriptive statistics			Mann – Whitney test	
	N	M	SD	U	p
Attends music school	12	4,25	0,62		
Does not attend music school	92	3,16	1,10	869,500	<.001
Total	104	3,29	1,11		

Students rated how much they enjoyed creating musical content on a 5-point Likert scale, where 1 indicated "dislike" and 5 indicated "like very much." On average, students were indecisive (neither dislike nor like), with a mean rating of $M = 3.29$. The standard deviation was $SD = 1.11$, suggesting that students perceive activities connected with creating music as fairly enjoyable. Given the proportion of the mean taken by the standard deviation, there is a higher level of variability in the assessment of the enjoyability of music creation among students ($KV \% = 33.74$) – indicating a greater deviation of individual results from the mean. Therefore, it can be concluded that how much they enjoy creating musical content varies widely. The outcome of the Mann-Whitney test indicates that activities connected with creating musical content are more popular among students who attend music school than among those who do not attend ($p < .001$).

The outcome of the Kruskal-Wallis test for differences in the rating of the popularity of activities connected with creating musical content among students based on grade level ($p = .024$) indicates that music creation is most popular among 6th-grade students ($M = 4.08$), where the activities are, on average, enjoyable or very enjoyable. They are followed by 7th-grade students ($M = 3.50$), then 8th-grade students ($M =$

3.14), and finally, 9th-grade students ($M = 3.09$), who, on average, are undecided in their assessment of the enjoyability of these activities (neither dislike nor like). The standard deviation in the rating of 9th-grade students is $SD = 1.18$, suggesting that despite being undecided, they still find the activities fairly enjoyable. Figure 1 illustrates that the popularity of music creation activities decreases as students' progress to higher grades.

Table 4: Results of the Kruskal-Wallis Test for Differences in the Rating of the Popularity of Activities Connected with Creating Musical Content, based on Grade level.

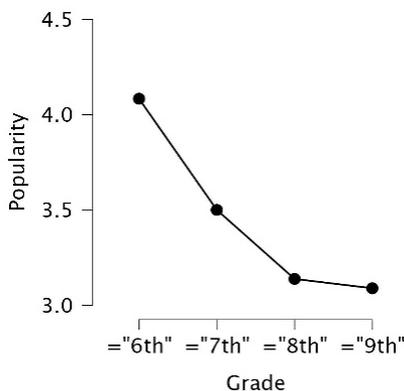|	Grade	Descriptive statistics			T-Test		Kruskal – Wallis test	
		N	M	SD	F	p	x^2	p
Popularity of activities connected with creating musical content	**6th grade**	12	4,08	0,67	3,100	.030	0,433	.024
	7th grade	18	3,50	1,30				
	8th grade	29	3,14	0,88				
	9th grade	45	3,09	1,18				

Figure 1: Diagram of the Popularity of Music Creation Activities based on the Grade level.

3.3. Perception of Activities Connected with Creating Musical Content

Most students perceive activities connected with creating musical content positively, as more than half of them feel relaxed (60.32%) while creating, 38.48% feel happy, and just over a quarter of the students feel excited (28.08%). Among students who feel negatively about the creation process, a good quarter of them find it boring (23.92%), and just under a fifth have no interest in creating music at all (18.72%). The fewest students feel restless (7.28%), and 4.16% feel afraid. Under "Other,"

students listed positive perceptions of creating musical content, such as fun, interest, full of ideas, playful, and happy, as well as negative perceptions like stage fright, restlessness, and awkwardness when presenting the created musical content.

Table 5: Frequencies (*f*) and Structural Percentages (*f*%) of Students' Responses Regarding the Perception of Activities Connected with Creating Musical Content.

	Perception	*f*	*f*%
Positive perception	Relaxed	58	60,32 %
	Excited	27	28,08 %
	Happy	37	38,48 %
	Positive perception in total	129	134,16 %
Negative perception	Restless	7	7,28 %
	Awkward	11	11,44 %
	I am afraid	4	4,16 %
	Uninterested	18	18,72 %
	I am bored	23	23,92 %
	Negative perception in total	71	73,84 %
	Other	15	15,60 %
	Total of all responses*	215	223,60 %

*The sum of categories (f) is not equal to the sample size due to a multiple-choice question.

The outcome of the Chi-square test for independence shows that girls express more excitement during creation than boys (χ^2 = 5.098; p = .024), while boys feel more restless during creation compared to girls (χ^2 = 4.645; p = .031). Interestingly, 9th-grade students, compared to 6th-grade students, feel more bored while creating (χ^2 = 8.981; p = .030) and feel more restless (χ^2 = 8.232; p = .041). It is also noted that students attending music school feel more relaxed while creating compared to those who do not attend (χ^2 = 4.608; p = .032).

On a 5-point Likert scale, students rated their agreement with statements that conceptually covered the perception of activities connected with creating musical content, where 1 meant "strongly disagree," and 5 meant "strongly agree."

The Mann-Whitney test for differences indicates that students attending music school, compared to those who do not, more strongly agree with the statement *I am good at creating musical contents* (U = 903.000; p < .001) and *I enjoy creating musical content independently* (U = 774.500; p = .020). On the other hand, students who do not attend music school more strongly agree with the statements *Creating musical content is hard*

($U = 303.000$; $p = .009$) and *Creating musical content is a challenge* ($U = 200.500$; $p < .001$).

Table 6: Results of the Mann-Whitney Test for Differences in Agreement with Statements regarding Activities Connected with Creating Musical Content, based on Music School Attendance.

Statement	Music school attendance	Descriptive statistics			Mann – Whitney test	
		N	M	SD	U	p
I am good at creating musical content	Yes	12	4,25	0,94	903,000	<.001
	No	92	3,05	1,13		
I enjoy creating musical content independently	Yes	12	3,25	1,14	774,500	.020
	No	92	2,41	1,14		
Creating musical content is hard	Yes	12	2,33	1,44	303,000	.009
	No	92	3,40	0,98		
Creating musical content is a challenge	Yes	12	2,08	0,79	200,500	<.001
	No	92	3,24	0,88		

3.4 Opinions of Students regarding the Actual Implementation of Activities Connected with Creating Musical Content in Subject Music Art

Lastly, we were interested in students' opinions and suggestions for improving the implementation of activities connected with creating musical content. More than half of the students (57.20%) believe that creating musical content is interesting, and they would not change anything in the activity's implementation.

Some responses pertained to the execution of music education itself. Interesting suggestions were highlighted: "I wish there were no assessments in music lessons.", "I wish there were no grades in music lessons because it puts extra pressure on me.", "I would like music lessons to take place in smaller groups, because that make it easier to work together.", "I wish there were fewer students in the classroom because then it wouldn't be so loud when we're working on musical content." and "I wish we could have music lessons outside in nature more often."

Students commented on the implementation of activities related to the creating musical content in groups: "I like that we can choose our own pair or group when creating music content." and "I would prefer it if we could always choose our own pair or group when creating."

The students also suggested some improvements in the execution of the musical content: "The ability to play different instruments, not just Orff instruments.", "Having access to more instruments." and "I would prefer not to have to perform our own songs at class concerts."

Finally, one of the students suggested the use of digital technology in the creation of music content: "To write songs with a computer program."

4   Discussion

Firstly, we highlight the finding that among students from $6-9$ grades, the most popular musical activities are playing instruments, listening to music and singing. This confirms the observations of Juhart et al. (2023), who found that among students in the third educational cycle, playing instruments and singing are the most popular activities. However, activities connected with creating musical content are also popular among students participating in Juhart et al. (2023) study, while our results indicate that they are the least popular. Nevertheless, we find that students are generally undecided (neither yes nor no) about the enjoyment of activities connected with creating musical content, or they perceive them as enjoyable. This is confirmed by the opinions of more than half of the students, stating that they would not change anything in the execution of creative activities in music during Music Art classes because they find it enjoyable and interesting. The most popular activities connected with creating musical content are improvisation and creating their own songs. The study aligns with the findings of Leung (2008), who suggests that creating one's own songs fosters higher levels of interest and enjoyment among students.

The results indicate significant differences in students' attitudes towards activities connected with creating musical content based on gender, grade, and music school attendance. We find that the popularity of activities connected with creating musical content decreases with age, as it is more popular among sixth graders than among ninth graders. This supports findings (Burnett, 2002; Papageorgi & Economidou Stavrou, 2023) that point to age-related decreases in satisfaction with the learning environment, or that younger students perceive the classroom environment more positively than older students. At the same time, this contradicts Habe and Tandler (2013), who do not find differences in the favourability of Music Art classes between fourth and fifth graders and eighth and ninth graders in Slovenian elementary

schools. Creative activities in music are also more popular among girls than boys, supporting studies (Crowther & Durkin, 1982; Button, 2006; Leung, 2008; Kokotsaki, 2016) that have established that girls show a greater inclination towards creativity than boys. Lastly, the study also supports observations (Eccles & Wingfield, 2002; Eldemir, 2006; McPherson & O'Neill, 2010) that students attending music school exhibit a more positive attitude toward music education.

The results relating to the question on perception of activities connected with creating musical content show that students generally have a positive experience with creating music and feel relaxed on average while engaging in creative activities. The study supports the observations of Menard (2015) that creating music is a pleasant activity and that, on average, students are not intimidated by musical creation. We observe that compared to boys, girls express more enthusiasm for creating musical content and feel less restless while creating. We find that there is a difference between students attending music school and those who do not. Students attending music school prefer to create music independently and believe that they are good at it. This supports the observations of Burnard (1995), who notes that students with knowledge of an instrument have more confidence in their musical competencies. Students who do not attend music school perceive creating musical content as a challenge and a more demanding activity.

5 Conclusion

The findings of the study provide a better understanding of students' attitudes and perceptions related to activities connected with creating musical content, emphasizing the importance of experiential learning in music education. The results indicate that creative activities in music are relatively popular among students from 6-9th grade, with improvisation and creating their own songs emerging as the most favoured forms of creative expression in music. The research highlights significant differences in the attitudes and perception of activities connected with creating musical content based on gender, grade, and music school attendance. The majority of students perceive creating music as an enjoyable activity. The limitations of the study are acknowledged in the limited scope of the convenient research sample, which was restricted to students from a single primary school. Additionally, the self-assessment responses of students are subjective in nature and may contain biases. In extending and improving the research, it would be meaningful to explore the

influence of teachers on students' attitudes toward music activities, differences in attitudes toward creating musical content between first, second and third educational cycles, and the attitudes of students toward music creation in primary schools across various Slovenian regions.

The study provides insights into students' experiences and attitudes toward creating musical content, opening the door for further research. Simultaneously, it raises important questions about adjustments to music education during the third educational cycle that could stimulate greater interest in creative activities and strengthen students' relationships with music and music education.

References

Akman, Y. (1992). The place and importance of guidance in primary education. *Hacettepe Üniversitesi Eğitimi Fakültesi Dergisi, 8,* 317-320.

Baloche, L. (1994). Creativity and cooperation in the elementary music classroom. *The Journal of Creative Behaviour*, *28*(4), 255–265. https://psycnet.apa.org/doi/10.1002/j.2162-6057.1994.tb00732.x

Biasutti, M. (2015). Pedagogical applications of cognitive research on musical improvisation. *Frontiers in Psychology*, *6*, 614. https://doi.org/10.3389/fpsyg.2015.00614

Bolden, B. & DeLuca C. (2022). Nurturing student creativity through assessment for learning in music classroom. *Research Studies in Music Education*, *44*(1), 273-289. https://doi.org/10.1177/1321103X211054793

Borota, B. (2013). *Glasbene dejavnosti in vsebine* [*Musical activities and content*]. Univerza na Primorskem, Znanstveno-raziskovalno središče, Univerzitetna založba Annales.

Burnett, P. C. (2002). Teacher praise and feedback and students' perceptions of the classroom environment. *Educational Psychology, 22*(1), 5–16. https://doi.org/10.1080/01443410120101215

Burnard, P. (1995). Task design and experience in composition. *Research Studies in Music Education, 5,* 32–46. https://doi.org/10.1177/1321103X9500500104

Burnard, P. & Power, A. (2013). Issues in conceptions of creativity and creativity assessment in music education. In K. Thomas & J. Chan (Ed.). *Handbook of research in creativity* (pp. 212-229).

Button, S. (2006). Key Stage 3 pupils' perception of music. *Music Education Research, 8*(3), 417-431. https://doi.org/10.1080/14613800600957529

Crowther, R. D. & Durkin, K. (1982). Sex-and age-related differences in the musical behaviour, interests, and attitudes towards music of 232 secondary school students. *Educational studies, 8*(2), 131-140. https://doi.org/10.1080/0305569820080206

Curriculum. Music Art. (2011). Ljubljana: Ministrstvo za šolstvo in šport. https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/UN_glasbena_vzgoja.pdf

Črčinovič Rozman, J. (2009). Musical creativity in Slovenian elementary schools. *Educational research, 51*(1), 61–76. http://dx.doi.org/10.1080/00131880802704749

Denac, O. (2012). *Načrtovanje glasbenih dejavnosti v zgodnjem obdobju otroštva* [*Planning musical activities in early childhood*]. Visokošolski učbenik. Maribor: Pedagoška fakulteta.

Eccles, J. S. & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual review of Psychology, 53*(1), 109-132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Economidou Stavrou, N. & Papageorgi, I. (2021). 'Turn up the volume and listen to my voice': Students' perceptions of music in school. *Research Studies in Music Education, 43*(3), 366-385. http://dx.doi.org/10.1177/1321103X20929709

Eldemir, A. C. (2006). An investigation of 4th grade students' attitudes towards music class. *International Journal of Human and Behavioural Science, 2*(1), 8-19. https://doi.org/10.19148/ijhbs.67063

Faulkner, R. (2003). Group composing pupil perceptions from a social psychological study. *Music Education Research, 5*(2), 101-124. https://doi.org/10.1080/1461380032000085504

Gorder, W. D. (1980). Divergent production abilities as constructs of musical creativity. *Journal of Research in Music Education, 28*(1), 34–42. https://doi.org/10.2307/3345051

Gordon, E. E. (1989). Audiation, music learning theory, music aptitude and creativity. *Suncoast Music Education Forum on Creativity*, 75–81.

Habe, K. & Tandler, K. (2013). Motivacija osnovnošolcev za glasbeni pouk [Motivation of elementary school students for music lessons]. *Glasba v šoli in vrtcu, 17*(1/2), 13–35.

Juhart, P. B., Bržan, P. P. & Kafol, B. S. (2023). Dejavniki glasbenega poučevanja v tretjem vzgojnoizobraževalnem obdobju osnovne šole z vidika učnih strategij [Factors influencing music teaching in the third stage of basic education from the perspective of teaching strategies]. *Glasbenopedagoški zbornik, 19* (38), 97-116.

Kocabaş, A. (1997). A study of basic education II. validity and reliability of the attitude scale of towards music. *Hacettepe University. Journal of Education, 13*, 141-145.

Kokotsaki, D. (2016). Pupils' attitudes to school and music at the start of secondary school. *Educational Studies, 42*(2), 201-220. http://dx.doi.org/10.1080/03055698.2016.1160822

Kokotsaki, D. & Hallam, S. (2007). Higher education music students'? Perceptions of the benefits of participative music making. *Music Education Research, 9*(1), 93-109. http://dx.doi.org/10.1080/14613800601127577

Kroflič, R., Rutar, S. & Borota, B. (2022). Umetnost v vzgoji v vrtcih in šolah: projekt SKUM [Art in education in kindergartens and schools: SKUM project]. Koper: Založba Univerze na Primorskem. https://doi.org/10.26493/978-961-293-172-8

Leung, B. W. (2008). The effects of composition assignments and teacher presentation on student motivation in secondary schools. *Music Education Research International, 2*, 21-34.

Martinović Bogojević, J. (2021). *Fostering musical creativity in primary school*, Doctoral dissertation, University of Ljubljana. Univerza v Ljubljani: Akademija za glasbo. https://repozitorij.uni-lj.si/IzpisGradiva.php?lang=slv&id=125873

McPherson, G. E. & O'Neill, S. A. (2010). Students' motivation to study music as compared to other school subjects: A comparison of eight countries. *Research Studies in Music Education, 32*(2), 101–137. https://psycnet.apa.org/doi/10.1177/1321103X10384202

Menard, E. (2013). Creative thinking in music: Developing a model for meaningful learning in middle school general music. *Music Educators Journal, 100*(2), 61-67. https://doi.org/10.1177/0027432113500674

Menard, E. A. (2015). Music composition in the high school curriculum: A multiple case study. *Journal of Research in Music Education, 63*(1), 114-136. http://dx.doi.org/10.1177/0022429415574310

Menard, E. A. & Rosen, R. (2016). Preservice music teacher perceptions of mentoring young composers: An exploratory case study. *Journal of Music Teacher Education, 25*(2), 66-80. https://doi.org/10.1177/1057083714552679

Mihladiz, G., Duran, M. & Dogan, A. (2011). Examining primary school students' attitudes towards science in terms of gender, class level and income level. *Procedia-Social and Behavioural Sciences, 15*, 2582-2588. http://dx.doi.org/10.1016/j.sbspro.2011.04.150

Oblak, B. (2002). Umetnost je ustvarjalnost [Art is creativity]. *Glasba v šoli, 1*(2), 8.

Odam, G. (2000). Teaching composing in secondary schools: the creative dream. *British Journal of Music Education, 17*(2), 109-127. http://dx.doi.org/10.1017/S0265051700000218

Papageorgi, I. & Economidou Stavrou, N. (2023). Student perceptions of the classroom environment, student characteristics, and motivation for music lessons at secondary school. *Musicae Scientiae, 27*(2), 348-365. https://doi.org/10.1177/10298649211055832

Pucihar, I. (2016). Improvizacija – integralni del ustvarjalnega učenja in poučevanja klavirja [Improvisation – an integral part of creative piano learning and teaching]. Doctoral dissertation, Univerza v Ljubljani: Akademija za glasbo. https://repozitorij.uni-lj.si/IzpisGradiva.php?lang=slv&id=125834

Rotar Pance, B. & Igličar, E. (2017). Students' musical creativity and the role of teachers – a study of compositions written for the Music Olympiad. *Muzikološki zbornik, 53*(1), 165–183. https://doi.org/10.4312/mz.53.1.165-183

Rotar Pance, B. (2022). Razvoj sporazumevalne zmožnosti v glasbenem jeziku v projektu SKUM [Developing communicative competences in musical language in the SKUM project]. *Umetnost v vzgoji v vrtcih in šolah*, 171 - 195. http://dx.doi.org/10.26493/978-961-293-172-8.171-195

Sicherl-Kafol, B., Denac, O. & Borota, B. (2011). Glasbena umetnost. In N. Bucik, N. Požar Matijašič & V. Pirc (Eds.). *Kulturno-umetnostna vzgoja. Priročnik s primeri dobre prakse iz vrtcev, osnovnih in srednjih šol [Arts and cultural education. A handbook with examples of good practice from kindergartens, primary and secondary schools]*. Ljubljana: Ministrstvo za šolstvo in šport in Zavod Republike Slovenije za šolstvo, 91–95. http://www.zrss.si/kulturnoumetnostnavzgoja/publikacija.pdf

Smrtnik Vitulić, H., Kafol, B. S., Korošec, H., Podobnik, U., Prosen, S. & Geršak, V. (2022). Pomen umetniških izkušenj v vzgojno-izobraževalnem procesu v vrtcu, osnovni in srednji šoli [The importance of artistic experiences for the educational process in kindergarten, elementary school and secondary school]. *Umetnost v vzgoji v vrtcih in šolah*, 57 – 75. https://doi.org/10.26493/978-961-293-172-8.57-75

Strand, K. (2006). Survey of Indiana music teachers on using composition in the classroom. *Journal of Research in Music Education, 54*(2), 154-167. https://doi.org/10.2307/4101437

Sundin, B. (1997). Musical creativity in childhood-A research project in retrospect. *Research Studies in Music Education, 9*(1), 48-57. https://doi.org/10.1177/1321103X9700900106

Taštanoska, T. (2019). *The education system in the Republic of Slovenia 2018/2019*. Ljubljana: Ministry of Education, Science and Sport of the Republic of Slovenia. https://www.gov.si/assets/ministrstva/MVI/Dokumenti/ENIC-NARIC-center/The-Education-System-in-the-Republic-of-Slovenia-2018-19.pdf

Temmerman, N. (1993). School music experiences: How do they rate? *Research Studies in Music Education, 1*(1), 59-65. https://doi.org/10.1177/1321103X9300100107

Traven, M. (2019). Zastopanost glasbene dejavnosti ustvarjanja pri pouku glasbene umetnosti skozi vertikalo osnovnošolskega izobraževanja. [Creative musical activities in music classes across the primary education vertical [Master's Thesis, University of Ljubljana]. Univerza v Ljubljani, Pedagoška fakulteta.

Webster, P. (1990). Creativity as creative thinking. *Music Educators Journal, 76*(9), 22–28. https://doi.org/10.2307/3401073

Žnidaršič, J. (2022). Interdisciplinary interaction between music education and history: shaping the musical preferences in classical music of the 20th century. *CEPS Journal, 12*(2), 197-216. http://dx.doi.org/10.26529/cepsj.976

INCLUSION AND SPECIAL EDUCATION NEEDS
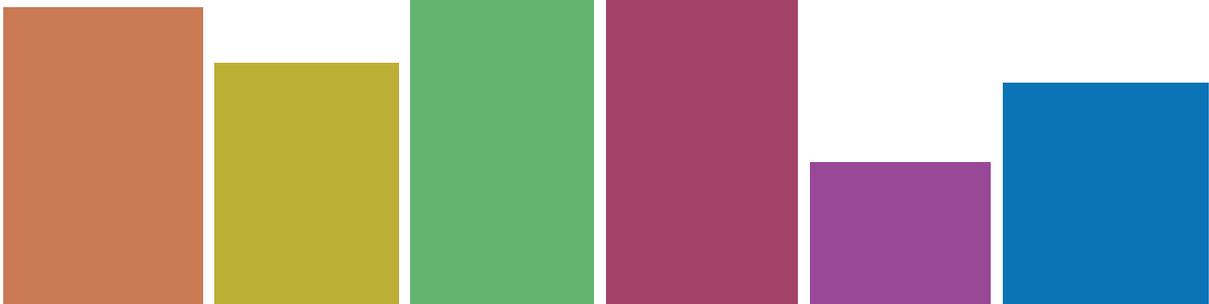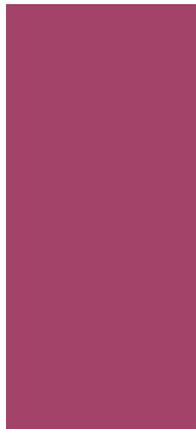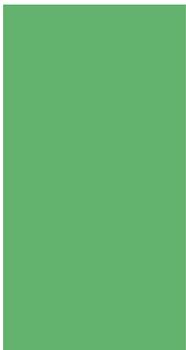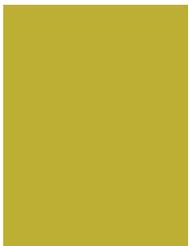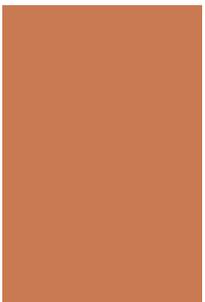
Inclusive Music Education: Strategies and Challenges in Teaching Music Lessons with a Student with Autism Spectrum Disorder Present in the Classroom

Katja Sevšek, Bojan Kovačič
University of Maribor, Faculty of Education, Maribor, Slovenia
katja.sevsek@gmail.com, bojan.kovacic@um.si

This study investigated musical methods of teaching and learning, forms of teaching, adaptations (school, classroom and lesson adaptations), and challenges faced by elementary school teachers when instructing music lessons in the presence of a student with autism spectrum disorder (ASD) in a mainstream classroom. Employing a mixed methods design, the research utilized a questionnaire and semi-structured interviews with a focus on eight key research questions, exploring teacher challenges, the impact of training and experience, collaboration with support networks, and teacher competencies in addressing the needs of students with ASD in music lessons. The findings underscore the need for specialized training and resources to both enhance inclusive education and effectively engage students with ASD in music lessons in the mainstream elementary classroom.

University of Maribor Press

Inkluziven pouk glasbene umetnosti: Strategije in izzivi poučevanja glasbene umetnosti, kadar je v razredu prisoten učenec z motnjo avtističnega spektra

KATJA SEVŠEK, BOJAN KOVAČIČ
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
katja.sevsek@gmail.com, bojan.kovacic@um.si

Ta raziskava preiskuje glasbene metode poučevanja in učenja, oblike pouka, prilagoditve (šole, razreda in pouka glasbene umetnosti) in izzive, s katerimi se soočajo učitelji pri pouku glasbene umetnosti v programu s prilagojenim izvajanjem in dodatno strokovno pomočjo, kadar je v razredu prisoten učenec z motnjami avtističnega spektra. Raziskava je osnovana na podlagi vprašalnika in polstrukturiranih intervjujev s poudarkom na osmih ključnih raziskovalnih vprašanjih. Slednja raziskujejo izzive učiteljev, vpliv izobrazbe in izkušenj učiteljev na izvedbo pouka glasbene umetnosti, sodelovanje učitelja s podpornimi mrežami in kompetence učiteljev pri obravnavi potreb učencev z motnjami avtističnega spektra pri pouku glasbene umetnosti. Ugotovitve poudarjajo potrebo po specializiranem dodatnem pedagoškem usposabljanju učiteljev za izboljšanje inkluzivnega izobraževanja in učinkovito vključevanje učencev z motnjami avtističnega spektra v pouk glasbene umetnosti v večinskem osnovnošolskem izobraževanju.

K. Sevšek, B. Kovačič: Inclusive Music Education: Strategies and Challenges in Teaching Music Lessons With a Student With Autism Spectrum Disorder Present in the Classroom

647

1   Introduction

Globally, the prevalence of autism as a neurodevelopmental disorder is increasing (Habe & Sicherl Kafol, 2020), leading to an increased demand for qualified professionals and effective teaching methods and strategies for students with autism spectrum disorder (ASD). In Slovenia, ASD is recognized as the most rapidly increasing developmental disorder (Ministry of Health, 2009). It is a lifelong condition that affects how individuals perceive and interact with the world around them (Attwood, 2007). Students with ASD are often isolated due to their unique communication (both verbal and nonverbal), behavioural challenges, and specific emotional and social needs (Draper, 2020; Obrul, 2016). Despite having the same diagnosis, two students with ASD may exhibit completely different characteristics and behaviors (Stone & Foy DiGeronimo, 2006). Nevertheless, it is crucial for students with ASD to be accepted and feel safe and free in society (Kodrič, 2006). This necessitates an education process that emphasizes the collaboration of parents, teachers, and other professionals working with the student (Chang, 2017; Križnar, 2019; Sobol, 2017; Udaze, 2016), a conclusion also supported by a national evaluation study (Vršnik Perše et al., 2016).

The Placement of Children with Special Needs Act (ZUOPP-1, 2011) establishes the educational framework for elementary school children with special needs in Slovenia. It sets forth the goals and principles of education for these children and highlights the importance of involving parents in the placement process, providing necessary support, and implementing an individualized approach to education. This ensures a comprehensive and inclusive education system for children with special needs in Slovenia. Children with ASD who can meet the standards of the elementary school curriculum are directed to a program with adapted implementation and additional professional assistance (Ministry of Education, 2021). In such a program, the student receives adjustments that should not hinder other students but should be helpful enough to enable their participation alongside their peers. Also, they receive additional professional assistance to help overcome deficits, obstacles, or impairments, including counselling or educational support.

Successful inclusion requires the adaptation of teaching methods and approaches to cater to the individual needs of students. This calls for the comprehensive training of the educators involved, empowering them to recognize and apply techniques that

enable students to reach their maximum potential (Globačnik, 2020; Kocjančič, 2017; Lindsay, 2013). This approach emphasizes the importance of specialized educator training as a key factor in fostering an inclusive educational environment that promotes the growth and development of all students, especially those with special needs, allowing them to flourish and utilize their abilities to the fullest extent.

In the field of music education, a variety of teaching and learning methods are employed in addition to general instructional approaches. These specific methods and diverse methodological systems play a vital role in enhancing the effectiveness and comprehensiveness of music education. By incorporating these specialized techniques, educators are able to cater to the unique needs and preferences of their students, fostering a more engaging and dynamic learning environment. By establishing effective musical methods of teaching and learning, forms of teaching, adaptations, and work planning, a teacher can influence the actual inclusion of students with ASD in educational and social environments (Johnson & LaGasse, 2021; Licardo & Schmidt, 2014). Furthermore, music can offer individuals with learning difficulties opportunities for creative, psychological, and social development (Wilson & MacDonald, 2019).

When a student with ASD is present in the classroom, it becomes essential to make specific adaptations to the school, classroom, and music lessons. These adaptations are necessary to ensure that students with ASD can thrive and make notable progress in their music education. With the support of professionals, clear objectives, and appropriate adjustments, students with ASD can make significant advancements, capitalizing on their unique strengths (Habe & Sicherl Kafol, 2020). By providing targeted assistance that caters to their specific needs, educators play a crucial role in guiding these students towards meaningful growth and development. It is crucial to adopt an individualized approach that recognizes the distinctive needs and characteristics of each child, going beyond the diagnosis of autism alone (Dempsey & Foreman, 2010; Drossinou-Korea & Fragkouli, 2016; Jurišić, 2006). Through this personalized approach, educators can create an inclusive and supportive learning environment that maximizes the potential of students with ASD.

For this study, eight pivotal research questions were developed to explore the dynamics of music lessons in a classroom that includes a student with ASD: (1) What challenges do teachers face in mainstream elementary school music lessons when a

student with ASD is present in the classroom? (2) How do the specific needs of a student with ASD influence the teacher's planning and delivery of music lessons? (3) How does the teacher's training and experience influence the use of musical methods of teaching and learning? (4) How does the teacher's training and experience affect the use of forms of teaching? (5) How does the teacher collaborate with the ASD student, their personal assistant, the school counselling service, and the student's parents? (6) What additional professional training do teachers receive, and to what extent? (7) Do teachers feel competent to recognize the characteristics of ASD? And (8) do teachers feel competent to work with students with ASD in music lessons?

2   Method

The aim of the study was to investigate the particularities of musical methods of teaching and learning, forms of teaching, and music lesson adaptations that teachers use when a student with ASD is present in the classroom. The teachers first completed a questionnaire and then participated individually in semi-structured interviews. To participate in the study, teachers were asked to select a student with ASD whom they had taught music to in the last 3 school years.

2.1   Participants

Table 1: Data From Teachers Participating in the Survey

	Musical education	Pedagogical education	Teaching seniority	Teaching grade
Teacher 1	a) None	d) 2-year program of the Pedagogical Academy*	d) 37 years	a) First grade (7-year-old ASD student)
Teacher 2	b) Primary music school	c) Faculty of Education (Elementary Education)	a) 8 years	b) Second grade (7-year-old ASD student)
Teacher 3	a) None	c) Faculty of Education (Elementary Education)	a) 7 years	d) Fourth grade (9-year-old ASD student)

* This programme no longer exists.

The sample consisted of mainstream elementary school teachers who teach music lessons in elementary education classrooms. To participate in the study, the teachers had to: a) complete all questions of the questionnaire, b) answer all questions in an individual interview, c) have a relevant qualification as an elementary school teacher,

d) have at least 5 years of experience as a teacher, and e) facilitate music class with a student with ASD aged 6–10 years in a neurotypical classroom. These criteria significantly limited the number of potential teachers who could participate in the study. We therefore focused on three cases in which the teachers met all the requirements.

2.2 Research instruments

The survey was conducted in two phases. First, the teachers completed a questionnaire consisting of seven A4 pages containing 10 questions and 63 sub-questions. After processing the collected data, the researchers contacted the teachers to arrange the interviews, which were conducted via Google Meet, where the interviews were also recorded to facilitate further data processing.

The questionnaire consisted of two parts:

- Part I consisted of closed-ended questions related to the independent variables listed in Table 1;
- Part II consisted of closed questions on a 5-point Likert scale with questions on the dependent variables listed in Table 2.

Table 2: Presentation of the Independent Variables Used in the Survey

Independent variables			
Musical education	Pedagogical education	Teaching seniority	Teaching grade
a) None b) Lower primary c) Higher primary d) Secondary / Conservatory e) Academy	a) Academy of Music b) Faculty of Education (Elementary Education) c) Faculty of Education (Music Education) d) Other	a) up to 10 years b) 11–20 years c) 21–30 years d) 31 years or more	a) First b) Second c) Third d) Fourth e) Fifth

Table 3: Presentation of the Dependent Variables Used in the Survey

Dependent variables		
Musical methods of teaching and learning	Forms of teaching	ASD characteristics
- *Methods of execution:* Demonstration of the rhythmic dictation (V1),	a) Frontal/Joint (V48) b) Group (V49)	Reduced ability to socialize (V25),

Dependent variables		
Imitation of the rhythmic dictation (V2), Vocal demonstration (V3), Singing with accompaniment (V4), Singing with imitation (V5), Singing with solfege syllables (V6), Demonstration of playing on children's musical instruments (V7), Imitation of playing on children's musical instruments (V8), Demonstration of movements to music (V9), Imitation of movements to music (V10), Reading musical notation (V11), Dictation (V12), Musical notation (V13) – *Methods of listening:* Experience-oriented listening (V14), Experience-analytical listening (V15) – *Methods of creation:* Creative singing (V16), Creative playing of instruments (V17), Rhythmic/Melodic complementation (V18), Rhythmic/Melodic questions and answers (V19), Inventions (V20) – *Making movement to music* (V21) – *Drawing to music* (V22) – *Creating writing to music* (V23) – *Didactic games* (V24)	c) Working in pairs (V50) d) Individual work (V51)	Reduced ability to communicate interests or emotions (V26), Impaired verbal communication (V27), Irregularities in eye contact (V28), Lack of understanding of body language (V29), Lack of understanding facial expressions and gestures (V30), Difficulty adapting behaviour to different situations (V31), Difficulty with tasks that require imagination (V32), Difficulty making friends (V33), Lack of interest in peers (V34), Repetitive movements or tics (V35), Sorting things (V36), Throwing things (V37), Echolalia (V38), Idiosyncratic expressions (V39), Insistence on routine and inflexibility (V40), Fear of change (V41), Strong attachment to objects (V42), Limited interests (V43), Hypersensitivity (V44), Hyposensitivity (V45), Distinctive reaction to a particular sound (V46), Motor restlessness (V47)

The semi-structured interview contained open questions based on comparable studies (Rogelj & Štule, 2020). These questions were formulated neutrally and complied with ethical standards for interviews, including content pertaining to obtaining consent, ensuring voluntary participation, maintaining anonymity, and protecting personal information (Mohd Arifin, 2018).

2.3   Data analysis

Data collection took place from May to July 2023. Using a deductive approach to content analysis based on predetermined themes, the data were methodically processed in phases as described by Elo and Kyngäs (2008). The interview analysis began with the transcription of the interviews, followed by a coding process. Subsequently, the findings from the interviews were interpreted in a meaningful way and related to the findings from the questionnaires.

3   Results

Three main research themes with seven subthemes were identified, as presented in Table 4. Also, see Figure 1.

Table 4: Identification of Themes, Subthemes, and Codes

Theme	Subtheme	Code
A student with ASD at music lessons within a mainstream elementary classroom	Characteristics of a student with ASD	Verbal communication Social interactions Motivation Behaviour Sensory peculiarities Skills and knowledge
	Adaptations	School adaptations Classroom adaptations Music lesson adaptations
Teacher's activity	Education	Musical education Pedagogical education
	Music lesson	Music lesson preparation Musical methods of teaching and learning Forms of teaching
Teacher's pedagogical approach	Experiences	Teaching students with ASD Teaching music lessons
	Cooperation	Student's personal assistant School counselling services Student's parents
	Additional professional training	Seminars Trainings
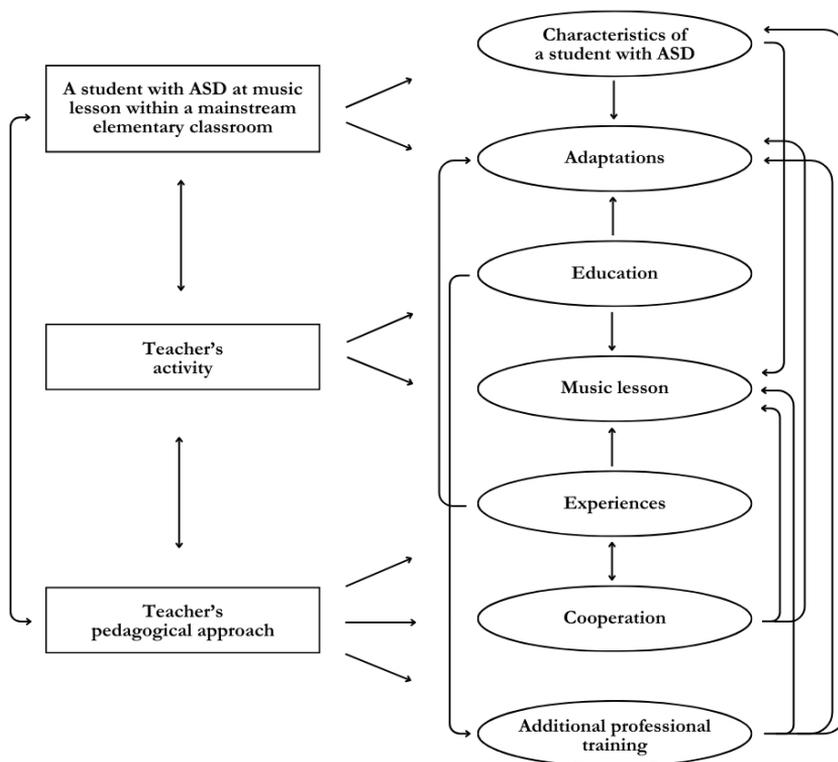
Figure 1: Conceptual Grid of Research Topics and Subtopics.
Source: own

3.1 A Student With ASD at Music Lessons Within a Mainstream Elementary Classroom

In elementary music lessons, teachers often observe distinct differences between students with ASD and their neurotypical peers. These differences manifest through various behavioural markers that are characteristic of ASD, such as motor restlessness (V47), atypical responses to musical sounds or rhythms (V46), and irregularities in eye contact (V28). These behaviors reflect the sensory processing and communication differences associated with ASD, and due to the sensory nature of music, they may be particularly noticeable in a musical setting. One significant

challenge for students with ASD is social engagement (V25), which is often hindered by communication difficulties (V27). They may struggle to interpret nonverbal cues, such as facial expressions (V30) and body language (V29), and struggle to express and communicate their emotions effectively (V26). Despite these challenges, students with ASD have a strong desire to be accepted and participate alongside their neurotypical peers, not just in music but in all aspects of life (V25, V34). Conversely, neurotypical students may also face challenges when interacting with peers with ASD in music lessons. Initially, they may find it difficult to understand and connect with students who exhibit ASD characteristics. Therefore, neurotypical students also require time and guidance to fully comprehend and embrace the differences presented by their ASD peers.

The dynamics within a music class highlight the importance of inclusive teaching practices that cater to the diverse needs of all students. For students with ASD, music lessons provide both challenges and opportunities for social interaction and sensory engagement. Teachers play a crucial role in creating an environment where all students, regardless of their neurotypical or ASD status, can learn, interact, and grow together. Teachers also find that structuring music lessons to meet the needs of students with ASD can be beneficial for all. Activities that are clear, predictable, and sensory-friendly not only support students with ASD in their learning journey but also foster empathy and understanding among neurotypical students, ultimately enriching the educational experience for the entire class.

The teachers' observations indicated a noticeable decrease in engagement among students with ASD during music lessons, necessitating additional support and attention to achieve their educational goals. Moreover, there were instances where these students disrupted lessons, prompting the teachers to devise specific strategies for maintaining classroom harmony. In addressing the educational needs of students with ASD in the music lessons, the teachers therefore identified several key strategies and challenges that led to a differentiated approach to classroom management and lesson planning. To address these disruptions and assist in focusing, the teachers introduced flexible physical accommodations, such as allowing students to lie down or take short walks. The adaptation of the classroom environment was a key strategy reported, involving the creation of "retreat corners" to provide a calming space for overwhelmed students. Furthermore, a consistent routine was maintained to offer a predictable and secure learning environment. The teachers also tailored their

K. Sevšek, B. Kovačič: Inclusive Music Education: Strategies and Challenges in Teaching Music Lessons With a Student With Autism Spectrum Disorder Present in the Classroom

655

assessment and evaluation methods to better cater to the learning styles of students with ASD, and they adjusted the organization of school materials to meet the ASD students' specific needs. Despite these adaptations, the teachers generally did not overhaul their music lesson plans but instead tailored them to the varying needs of the students with ASD. They continued to use age-appropriate teaching methods effective with neurotypical learners, including a range of creative activities like drawing (V22), creative playing on instruments (V17), and dancing (V21). Continually redirecting the attention of students with ASD and helping them with organizing school materials were focal points, however, to ensuring the students' sustained participation in lessons, a task that teachers acknowledged as challenging while trying to maintain the overall lesson flow.

3.2   Teacher's Activity

This study also sheds light on a significant gap in the teacher training curriculum, specifically regarding the education of students with ASD in music lessons at the elementary level. According to the findings, the teachers received no information or training on working with children with autism during their university studies. They were provided only with a basic overview of different special needs categories but lacked in-depth focus on specific teaching methodologies or adaptation strategies tailored for students with special needs, including those with ASD. This lack of specialized training created a pressing issue, as students with ASD require specific teaching approaches and techniques to facilitate effective learning.

The teachers instructing students diagnosed with ASD adopted various approaches to effectively engage and instruct these individuals in music lessons. Commonly utilized musical methods of teaching and learning included singing with accompaniment (V4), drawing to music (V22), making movement to music (V21), experience-oriented listening (V14), experience-analytical listening (V15), and vocal demonstration (V3). These approaches, widely adopted by teachers, primarily aligned with the age, grade level, and curriculum of the students, rather than being specifically tailored to accommodate the unique needs of individuals with ASD. This suggests that the foundational approach to teaching music in these settings remained largely unchanged in the presence of students with ASD. Moreover, the predominant form of teaching in these classes was a frontal/joint form of teaching (V48), although teachers recognized the effectiveness of working in pairs (V50).

Working in pairs allowed for a relatively improved control and focus, which appeared particularly advantageous for the students with ASD, as they tended to engage more actively and maintain concentration for longer periods in such settings compared to frontal teaching methods.

Despite using effective strategies, the teachers consistently faced several challenges when teaching music lessons to students with ASD. One significant observation was that the teachers often limited the use of musical instruments due to concerns of overstimulation or unexpected reactions from the students with ASD. This caution arose from worries about these students' potential hypersensitivity to specific sounds (V46). Additionally, the teachers found that these students often struggled with imaginative tasks or generating new content (V32), leading to a preference for maintaining routine lesson structures (V40) to prevent distress (V41).

A crucial insight from teachers was the limited use of group teaching methods (V49) due to the low participation levels of students with ASD. These students appeared to require more individualized attention, explicit instructions, and clear guidance. In contrast to group activities, pair-work emerged as a preferred approach, allowing for more personalized assistance and role allocation that benefitted both the student with ASD and their partner. However, a notable challenge was the apparent lack of motivation among students with ASD for various musical activities, including singing, playing instruments, and dancing. The teachers reported a general unresponsiveness during these activities, with students often avoiding eye contact (V28) and physically withdrawing, except in instances where students found enjoyment in the activity or when a specific song was repeated multiple times. Furthermore, any minor deviations from routine (V40) or changes in instruments (V41) could trigger intense emotional and sometimes impulsive responses (V31) from these students. However, it was also consistently noted by all teachers that the students with ASD did not face challenges in order to meet their learning objectives.

3.3   Teacher's Pedagogical Approach

The teachers often expressed a sense of inadequacy regarding their ability to effectively teach music to students with ASD. Despite their firm belief in the affinity these students had for music, there existed a notable uncertainty about how to engage them meaningfully in music lessons. This uncertainty stemmed from a

perceived lack of specific knowledge and skills tailored to the unique learning needs of students with ASD. Furthermore, this gap in expertise not only hindered the teachers' confidence but also potentially impacted the quality of music education provided to these students.

The teachers' responses in the study brought to light a notable disparity in their experiences regarding collaboration with the students' personal assistants (if there was one), the school counselling service, or the students' parents. One teacher encountered a particularly challenging situation where their limited influence over collaborative efforts became evident. The teacher faced difficulties in understanding and meeting the unique needs and strengths of a student due to the student's mother opposing the Ministry's decision to transfer the child from a regular school to a specialized program. As a result, the necessary adjustments and supports typically provided in a specialized setting were then not available. The teacher had to rely solely on their own discretion and judgment to make minimal modifications for the student's education in the mainstream school environment. In contrast, two other teachers in the study reported receiving substantial support from various sources. They emphasized the importance of ongoing and precise communication among all parties involved, particularly highlighting the indispensable role of parents in the successful inclusion of students with ASD in music lessons. Moreover, both teachers advocated for the presence of a personal assistant in mainstream school settings for students with ASD. They argued that managing a class of 25 students, including those with ASD who may require constant support, poses significant challenges for a single teacher. Having a personal assistant dedicated to supporting the ASD student can help create a more inclusive and effective learning environment for the entire class. This approach acknowledges the complexities of teaching in a diverse classroom and underscores the significance of adequate support systems for both students and teachers.

The teachers participating in the research sought out specialized professional training focused on educating students with ASD. However, this pursuit was initiated only after they encountered an ASD student for the first time in their professional career. The additional training was mainly comprised of seminars that offered a broad overview of the characteristics associated with ASD. Unfortunately, these seminars did not meet the teachers' expectations and needs, lacking specific, actionable information and practical guidance that they deemed crucial for their

teaching practice. Recognizing the limitations of the seminars, the teachers took it upon themselves to seek alternative resources, such as educational literature, to supplement their understanding and skills. Despite the availability of formal training, many teachers perceived it as insufficient or not aligned with their specific needs. They expressed a desire for hands-on, practical information and real-life examples that could be directly applied in their music classes. Interestingly, the teachers reported that their most valuable insights and strategies for engaging students with ASD in music lessons came from direct, hands-on experiences in the classroom. This practical exposure enabled the teachers to develop personalized approaches and adapt their teaching methods effectively, which was previously reported by Licardo (2007–2013), who stated that the most important aspect of a teacher's professional development following their undergraduate education is learning through experience. This finding underscores the importance of experiential learning in enhancing teachers' ability to support students with ASD. It also highlights a gap in current professional development offerings, suggesting the need for more experiential, classroom-based training opportunities that provide teachers with the practical tools and examples they require to effectively teach and support students with ASD in music education.

4   Discussion

In music lessons within elementary school classrooms, the imperative to include students with ASD is a particular challenge and requires a multifaceted pedagogical approach. The teachers in this study often observed a decline in engagement and interest among students with ASD, necessitating creative and adaptable strategies to promote the students' active participation and cultivate a harmonious classroom atmosphere. Inclusive education, as advocated by Stamou et al. (2019), aims to create an educational environment where all students, regardless of their neurological differences, feel valued and included. Incorporating innovative methods like integrating physical movement into music lessons and establishing consistent routines has proven effective in enriching the educational journey for students with ASD. These techniques, rooted in multisensory learning, not only facilitate the understanding of musical concepts but also create an environment that is structured and predictable, thereby reducing anxiety and behavioural challenges that these students may face.

K. Sevšek, B. Kovačič: Inclusive Music Education: Strategies and Challenges in Teaching Music Lessons With a Student With Autism Spectrum Disorder Present in the Classroom

659

Facilitating music lessons with students with ASD appears to require tailored strategies, collaborative support systems, and adaptive teaching approaches. By addressing the challenges and implementing inclusive practices, teachers can create a more inclusive and enriching music classroom environment for all students (Scott, 2016). Despite the challenges, the teachers in this study emphasized the importance of using age-appropriate methods for neurotypical learners while redirecting attention to keep the students with ASD engaged. This required a delicate balance between adapting instruction to meet the current needs of students with ASD and meeting the overall learning objectives of the class, which was also reported by Darrow (2003). The effective involvement of students with ASD in music lessons requires an understanding of their sensory and communication needs, as well as adaptability in teaching methods to accommodate their learning styles. While the teachers made some adaptations to accommodate the students with ASD in their music lessons, these adjustments appeared to align more closely with general teaching practices rather than being specifically tailored to the unique needs of individuals with ASD.

5 Conclusions

Despite the teachers' adaptation efforts, a gap in teacher preparedness for helping students with ASD was evident. As Nordlund (2006) highlighted, many teachers lack comprehensive training in teaching methodologies specific to students with ASD. This deficiency often leads teachers to rely on experiential learning and trial-and-error tactics, which may not fully address the diverse needs of students with ASD. Consequently, there is a critical need for specialized training programs that focus on pedagogical strategies tailored to students with ASD in music lessons. These training modules should incorporate practical components, such as classroom adaptations and specific teaching aids, complemented by case studies and real-life scenarios. By implementing these changes, teacher training programs can become more effective and responsive to the needs of all students, ensuring that teachers are well-equipped to provide a supportive and enriching learning environment for students with ASD, particularly in specialized subjects like music.

References

Attwood, T. (2007). *The Complete Guide to Asperger's Syndrome*. Jessica Kingsley Publishers.

Chang, A. C. (2017). *String teachers' perceptions of inclusion of students with autism in classroom settings* (Doctoral dissertation). ProQuest Dissertations Publishing. https://www.proquest.com/dissertations-theses/string-teachers-perceptions-inclusion-students/docview/1961606343/se-2

Darrow, A.-A. (2003). Dealing with diversity: The inclusion of students with disabilities in music. *Research Studies in Music Education, 21*(1), 45–57. https://doi.org/10.1177/1321103X030210010401

Dempsey, I., & Foreman, P. (2001). A review of educational approaches for individuals with autism. *International Journal of Disability, Development and Education, 48*(1), 103–116. http://dx.doi.org/10.1080/10349120120036332

Draper, A. R. (2020). *Music education for students with disabilities* (Doctoral dissertation). ProQuest Dissertations Publishing. https://www.proquest.com/dissertations-theses/music-education-students-with-disabilities/docview/2448856862/se-2

Drossinou-Korea, M., & Fragkouli, A. (2016). Emotional readiness and music therapeutic activities. *Journal of Research in Special Education Needs, 16*, 440–444. https://doi.org/10.1111/1471-3802.12305

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing, 62*(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

Globačnik, B. (2020). *Obravnava in učenje otrok z avtizmom* [Intervention and education of children with autism]. Didakta, 30(207), 4–7. https://www.dlib.si/details/URN:NBN:SI:doc-K3JNI9TN

Habe, K., & Sicherl Kafol, B. (Eds.). (2020). *Glasba in Avtizem* [Music and Autism] (1st ed.). University of Ljubljana, Faculty of Education.

Johnson, E., & LaGasse, A. B. (2021). Musical creativity in autism: Exploring growth through collaborative peer interaction. *International Journal of Disability, Development and Education, 69*(1). https://doi.org/10.1080/1034912X.2021.1940883

Jurišić, B. D. (2006). *Učenje Otrok s Spektroavtistično Motnjo za Čim Bolj Samostojno Življenje in Delo. Izbrana Poglavja iz Pediatrije* [Education of Children With Autism Spectrum Disorder for the Most Independent Life and Work Possible. Selected Chapters From Pediatrics]. University of Ljubljana, Faculty of Medicine.

Kocjančič, N. F. (2017). Inkluzivna vzgoja in izobraževanje otrok in mladostnikov z avtističnimi motnjami [Inclusive education of children and adolescents with autism disorders]. *Vzgoja in Izobraževanje: Revija za Teoretična in Praktična Vprašanja Vzgojno Izobraževalnega Dela, 48*(1/2), 9–15. https://www.dlib.si/details/URN:NBN:SI:doc-4ZKYDWZN

Kodrič, J. (2006). *Značilnosti Zgodnjega Razvoja Otrok z Avtizmom* [Characteristics of Early Development in Children With Autism]. University of Ljubljana, Faculty of Medicine.

Križnar, S. (2019). Poučevanje učencev z avtističnimi motnjami [Teaching autistic students]. *Vzgoja in Izobraževanje: Revija za Teoretična in Praktična Vprašanja Vzgojno Izobraževalnega Dela, 50*(1), 25–31. https://www.dlib.si/details/URN:NBN:SI:doc-5Y3P3MK6

Licardo, M. (2007–2013). *Vseživljenjsko Učenje in Učenje Učenja* [Lifelong Learning and Learning to Learn]. Ministry of Education. https://arhiv.acs.si/ucna_gradiva/Vsezivljenjsko_ucenje_in_ucenje_ucenja.pdf

Licardo, M., & Schmidt, M. (2014). Samoodločanje otrok in mladostnikov s posebnimi potrebami v izobraževanju [Self-determination of children and youth with special needs in education]. *Journal of Elementary Education, 7*(1), 65–82. https://www.dlib.si/details/URN:NBN:SI:doc-IXHZU61Z

Lindsay, S., Proulx, M., Scott, H., & Thomson, N. (2013). Exploring teachers' strategies for including children with autism spectrum disorder in mainstream classrooms. *International Journal of Inclusive Education, 18*(2), 101–122. https://doi.org/10.1080/13603116.2012.758320

K. Sevšek, B. Kovačič: Inclusive Music Education: Strategies and Challenges in Teaching Music Lessons With a Student With Autism Spectrum Disorder Present in the Classroom

661

Ministry of Education. (2021). *O osnovni šoli* [About elementary school]. https://www.gov.si/teme/o-osnovni-soli/

Ministry of Health. (2009). *Smernice za oblikovanje zdravstvene, vzgojno-izobraževalne in socialne mreže na področju celostne skrbi za osebe s spektroavtističnimi motnjami (SAM)* [Guidelines for developing a health, educational, and social network in the field of comprehensive care for individuals with autism spectrum disorders (ASD)]. https://www.gov.si/assets/ministrstva/MZ/DOKUMENTI/Preventiva-in-skrb-za-zdravje/Varovanje-in-krepitev-zdravja/dusevno-zdravje/Smernice.avtisti.pdf

Mohd Arifin, S. R. (2018). Ethical considerations in qualitative study. *International Journal of Care Scholars, 1*(2), 30–33. http://dx.doi.org/10.31436/ijcs.v1i2.82

Nordlund, M. (2006). Finding a systemized approach to music inclusion. *General Music Today, 19*(3), 13–16. https://doi.org/10.1177/10483713060190030104

Obrul, A. (2016). *Razvijanje glasbene nadarjenosti pri otrocih z avtizmom* (Unpublished master's thesis). University of Maribor, Faculty of Education, Slovenia. https://dk.um.si/IzpisGradiva.php?lang=slv&id=60206

Placement of Children with Special Needs Act (ZUOPP-1). (2011). *Official Gazette of the Republic of Slovenia*, No. 58/11, 40/12 – ZUJF, 90/12, 41/17 – ZOPOPP and 200/20 – ZOOMTVI. http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO5896

Rogelj, V., & Štule, P. (2020). Glasbena terapija za otroke in mladostnike z motnjami avtističnega spektra [Music therapy for children and adolescents with autism spectrum disorder]. In K. Habe & B. Sicherl Kafol (Eds.), *Glasba in Avtizem* (pp. 119–131). University of Ljubljana, Faculty of Education.

Scott, S. (2016). The challenges of imitation for children with autism spectrum disorders with implications for general music education. *Update: Applications of Research in Music Education, 34*(2), 13–20. https://doi.org/10.1177/8755123314548043

Sobol, E. S. (2017). *An Attitude and Approach for Teaching Music to Special Learners*. Rowman & Littlefield.

Stamou, A., Roussy, A. B., Ockelford, A., & Terzi, L. (2019). The effectiveness of a music and dance program on the task engagement and inclusion of young pupils on the autism spectrum. *Music & Science, 2*. https://doi.org/10.1177/2059204319881852

Stone, W. L., & Foy DiGeronimo, T. (2006). *Does My Child Have Autism? A Parents' Guide to Early Detection and Intervention in Autism Spectrum Disorders*. Jossey-Bass.

Udaze, J. (2016). *The implications of the collaboration among parents, teachers, and psychologists, parenting education provided by schools, and applied behavior analysis in the lives of children diagnosed with autism spectrum disorder* (Doctoral dissertation). ProQuest Dissertations Publishing. https://www.proquest.com/dissertations-theses/implications-collaboration-among-parents-teachers/docview/1807644175/se-2?accountid=28931

Vršnik Perše, T., Schmidt, M., Košir, K., Hmelak, M., Bratina, T., Licardo, M., Kalan, M., & Lorbek, T. (2016). *Evalvacija različnih oblik dodatne strokovne pomoči, ki je otrokom dodeljena v skladu z Zakonom o usmerjanju otrok s posebnimi potrebami: Nacionalna evalvacijska študija: Končno poročilo* [Evaluation of various forms of additional professional assistance assigned to children in accordance with the Placement of Children With Special Needs Act: A national evaluation study: Final report]. Maribor, Slovenia: Ministry of Education, Educational Research Institute. http://mizs.arhiv-spletisc.gov.si/fileadmin/mizs.gov.si/pageuploads/podrocje/razvoj_solstva/evalvacija/2017/Por_evalv_sp_ZUOPP_FINAL_170425.pdf

Wilson, G. B., & MacDonald, R. A. R. (2019). The social impact of musical engagement for young adults with learning difficulties: A qualitative study. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.01300

Father's Experiences in Caring for Twins with Autism and Associated Disorders

Darja Plavčak

University of Maribor, Faculty of Education, Maribor, Slovenia
darja.plavcak@um.si

The care of parents for children with special needs is an individual experience focused on finding a diagnosis and the reasons for the child's special needs, as well as determining which responses to the child's needs, emotions, and behavior are effective. In this article, we provide an overview of research in this field in the Slovenian context, complemented by a qualitative study, a case study of a father caring for twins with autism and associated disorders. For an in-depth analysis, we chose a narrative interview or autobiographical narrative of the father, supplemented by a review of documentation on redirecting children to appropriate educational programs and photographs, as well as memories. The case study provides guidelines for practitioners and education reformers, emphasizing the need to offer parents of children with special needs sufficient listening, information, support, and assistance, while raising awareness in the wider community and providing an environment for everyone to socialize, get to know each other, and make friends.

University of Maribor Press

Izkušnje očeta pri skrbi za dvojčka z avtizmom in pridruženimi motnjami

Darja Plavčak

Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
darja.plavcak@um.si

Skrb staršev za otroke s posebnimi potrebami je individualna izkušnja, osredotočena na iskanje diagnoze in razloga otrokovih posebnih potreb ter ugotavljanje, kateri odzivi na otrokove potrebe, čustvovanje in vedenje so učinkoviti. V prispevku podajamo pregled raziskav na tem področju v slovenskem prostoru in jih dopolnjujemo s kvalitativno raziskavo, študijo primera očeta, ki skrbi za dvojčka z avtizmom in pridruženimi motnjami. Za poglobljeno analizo smo izbrali narativni intervju oziroma avtobiografsko pripoved očeta, ki jo dopolnjujemo s pregledom dokumentacije o usmerjanju otrok v ustrezne vzgojno-izobraževalne programe, fotografijami in spomini. Študija primera praktikom in snovalcem prenove vzgoje in izobraževanja podaja smernice, ki poudarjajo, da je treba starše otrok s posebnimi potrebami poslušati ter jim nuditi dovolj informacij, opore in pomoči, ostalo družbo pa ozaveščati o tej tematiki ter poskrbeti za okolje, kjer se lahko vsi družijo, spoznavajo in prijateljujejo.

1   Introduction

The literature review shows that there are a few studies that, in general, indirectly investigate the area of parents of special needs children (SNC); these studies are mainly quantitative. In this paper, we will highlight segments that are relevant to our topic, breaking them down thematically into: (a) cooperation of parents of SNC with educational institutions, (b) parents of children with multiple disabilities, (c) associations for the empowerment of parents with SNC, (d) life changes of parents with SNC, and (e) parents' care for SNC who have autism.

a)   Cooperation of parents with SNC with educational institutions

Cavnik (2019) pointed out that parents of SNC should be included in the help and support systems from an early stage, and therefore kindergarten educators should be adequately trained. Jereb (2020) adds that in kindergartens, there are more seminars for educators than for parents with SNC, which should be changed.

Korpar (2021) elaborated on certain challenges in kindergarten: some parents with SNC find it difficult to recognize the importance of cooperation with the educator, but this changes in a positive direction when it comes to the redirection process for SNC into an appropriate educational program (the process usually takes place during the transition from kindergarten to school).

Kovačič Purgaj (2018) proved that parents of SNC need more time for themselves during the early treatment of their children, support from other parents of SNC, services for SNC near home, more additional information about services that will be available in the future of SNC, meetings with experts, etc. Krivec (2016) noted that parents generally have positive attitudes toward the inclusion of SNC in regular sections of kindergarten. Kozel (2021) also noted similar positive attitudes about inclusion in school, emphasizing that parents with SNC have more positive attitudes than parents with typical children.

Based on research, Hartman (2022) estimated that inclusive pedagogues in elementary schools include parents in the team designing and evaluating individualized programs for SNC, while the results of Makoter (2020) showed that there is insufficient cooperation with parents for first-grade teachers and educators.

The field of parental cooperation is therefore divided into different areas and has different effects. Plešec (2021) added that in the future more attention will have to be paid to the design and implementation of individualized programs and professional work with children and parents than to the redirection process itself.

Topolovec and Schmidt (2015) noted that after being transferred from a regular primary school to an adapted program with a lower educational standard, children with disabilities feel better because the program is more suitable for them. The disadvantage is that these schools are geographically scattered and SNC have fewer opportunities to socialize with their peers.

b)   Parents of children with multiple disabilities

Zadravec (2021) explained that parents who have a child with multiple disorders experience more stress and that, in general, SNC parents, compared to parents who have typical children, express lower values of mental well-being, except autonomy. At the end of the research, the author (Ibid.) suggested that a regression analysis should be carried out, which could be used to determine the factors that influence the stress and mental well-being of parents of SNC.

c)   Associations for the empowerment of parents with SNC

Gašparić (2021) wrote about the organizations, associations, and institutes in Slovenia that empower parents of children with disabilities, for example, the Školjke Maribor Society, SNOP Society, Bodi zdrav Association, Sožitje. These associations mostly operate in specific fields and focus on larger cities such as Ljubljana and Maribor.

d)   Life changes of parents with SNC

The involvement of both parents and relatives is crucial for the development of a child with autism. This collaboration is essential as the child requires assistance with activities such as eating, drinking, toileting, personal hygiene, and other basic life activities (Horvat, 2009). The majority of parents of children with disabilities completely adapt their lives to meet the needs of their children, affecting their employment and daily tasks (Kolarič, 2009).

Parents of children with autism are overwhelmed with work, childcare, and family responsibilities, lacking sufficient knowledge about their child's diagnosis and receiving inadequate support from professionals. The introduction of free therapies for children, accessible in their home environment, along with companions or potentially volunteers, and in the future, personal assistants, were suggested. Improved awareness and acceptance of autism within society would also contribute significantly, requiring efforts to raise public awareness (Gostenčnik, 2021).

e)   Parents' care for SNC who have autism

Children with autism can form attachments to their parents, although to a lesser extent than their typically developing peers. Parental sensitivity acts as a protective factor, preventing the development of insecure attachment in these children (Cugmas, 2018). Šnopl (2009) emphasized that the experiences of parents with a child with autism are unique to each family, but it is still noticeable that these parents often require more assistance from professionals and others. However, they are generally satisfied with the work of professional services. The most effective way to assist a child with autism is to identify the diagnosis early and initiate effective intervention with a quality educational plan (Ibid.).

The research problem presented in this article is based on the research question of exploring the experiences of a father, caring for twins, both of whom have autism and associated disorders. Making a narrative interview or autobiographical narrative story from the father allows for a broad coverage of this thematic area. The research aims to capture, in addition to the father's experiences, any feelings, thoughts, memories, and other aspects occurring in such a life experience that observers and researchers might not have considered (Ličen, 2013). Theoretical foundations will assist in the analysis and interpretation of the interview. The purpose of this qualitative research is to complement the results of other studies by delving into an atypical case and highlighting potential atypical life patterns.

2   Materials and Methods

2.1   Instrument

We conducted qualitative research using the biographical method. As a data collection instrument, we have made an autobiographical narrative interview with the father of twins with autism and other additional disorders.

The autobiographical interview allows for a retrospective view or focus on the life history of the interviewee. In the pre-phase, we familiarize ourselves with the interviewee, establish trust, explain the significance and purpose of the interview, and ensure anonymity. In the initial phase, we introduce the central theme of the conversation to the interviewee and pose an initial question that encourages the narration of their life story. The central phase is where the interviewee is listened to attentively and actively; only after they independently conclude their narrative, the questioning phase follows. In this phase, the researcher asks questions related to the heard narrative. In the concluding phase, we signal the end of the interview to the interviewee, followed by an informal conversation if desired (Rapuš Pavel, 2022). Nölke (1999) emphasized the crucial importance of granting the interviewee as much freedom in narration as possible in this method. This allows for obtaining an authentic narrative, where the interviewee confesses themes that are genuinely important to them. Ličen (2013) concludes that the 'narrative method, as a research method, is suitable for exploring experiences and memories and the formation of meanings in individuals and groups (ibid, p. 36).

To complement the autobiographical narrative with additional sources, we included a review of documentation related to the redirection of children to a specific adapted educational programme. In this review, we listed all the disorders with which the children are identified and added any potential divergent information contained in the documentation. The interviewee also contributed photographs as a source of data, depicting environments where they had engaged with the children.

2.2   Sample

We interviewed the father of twins, both of whom have autism and associated disorders; they were 15 years old at the time. We selected an atypical case, as we did not find an in-depth study in the literature on parents with twins with special needs.

We believe that such a case is even more complex than other typical cases, and thus, we are examining it separately and in-depth. We ensured the interviewee's data anonymity by not recording other details about him, except for his employment, which was related to caring for children with special needs. To preserve his anonymity, we omitted certain sensitive details from the story that could reveal his identity. However, we retained his story to a degree that still enabled the analysis.

2.3   Research plan

Based on the research problem, we contacted the interviewee, and inquired about the possibility of participating in our autobiographical interview. We explained the purpose and significance of the research for understanding the experiences of parents facing the more complex challenge of caring for SNC. We assured him of the anonymity of his identity and the protection of sensitive personal data. We offered an informal conversation after the interview, allowing him to gain feedback on his story, and to obtain any information he might need given his life situation. The interview was conducted via a video call to capture the interviewee's nonverbal communication and to provide active empathetic listening. While conducting the interview, we adhered to the phased approach outlined by Rapuš Pavel (2022). We recorded the video call for easier processing (with the interviewee's consent). The acquired data were subjected to hermeneutic-analytical analysis, wherein we attempted to interpret life paths, behavioral patterns, processes of growth and change on the continuum of past, present, and future, etc. (Rapuš Pavel, 2022). We largely relied on Nölke's (1999) explanation, that autobiographical analysis allows for the discovery of new patterns and themes in an individual's life that could not be predicted within predetermined categories. We also followed the guidance of Pajnik and Bajt (2009), who stated that interview analysis is initially divided into thematic segments, emphasizing what is important to the interviewee in the past, and how it influences their future, strictly adhering to the interviewee's narrative. Such an approach serves as a model for social-pedagogical interventions based on a good understanding of an individual's life situation. In the results of hermeneutic interpretation or autobiographical analysis, we strived to maintain the father's vocabulary as much as possible to preserve the authenticity of his experiences. Only when necessary for interpreting and explaining the story, we added a minimal number of words or a clarify term in parentheses – the latter is indicated with the abbreviation a.n. (i.e. author's note).

After the interview, we asked the interviewee for the children's documentation, through which they were directed to appropriate educational programs, and for any photographs that could reveal the places or attractions they visited with the children.

3 Results

In the results section, we present the hermeneutic analysis of the autobiographical narrative of the father of twins with special needs, supplemented by data from two sources: the documentation of redirecting the children to an appropriate educational program, and photographs, capturing memories of trips or others interesting family involvement in society.

3.1 Hermeneutic interpretation

Hermeneutically, the autobiographical narrative is interpreted by dissecting it into thematic sections in chronological order. The interviewee in our case study generally followed chronological order in the story itself; only towards the end, he returned to the description of the behavior and characteristics of the children, resulting in more entries in this segment. In Table 1, we assigned overarching thematic categories to all parts of the autobiographical narrative and numbered them accordingly.

Table 1: **Father's experiences, categorized by theme**

1.   Birth of twins and recognition of challenges
"Premature birth of twin boys; one born with 600g, the other with 800g birth weight. Extended period in the incubator after birth. Developmental delay emerged, resulting in incessant crying, screaming, episodes of shaking, impaired walking, and prolonged diaper use (one even until the age of 11). The situation worsened after initial vaccination: swollen eyelids and vomiting occur following their first mandatory vaccination."
2.   Monitoring children's development in the developmental clinic
"In the developmental clinic, efforts were made to teach the boys to walk, but they resisted with strange behavior– screaming, vomiting, refusing to cooperate."
3.   Kindergarten and observations of challenges
"Children enrolled in a regular kindergarten at the age of 4. Observations indicated that they behave differently and had additional care needs. They often cried uncontrollably, showing no interest in toys, and disliking physical contact."
4.   Caring for the child at home and establishing diagnosis in institutions
"The boys were attached to us, but they expressed it differently. They didn't reciprocate emotions and were rarely engaged in play. They required comfort 24 hours a day. We sought a diagnosis from two institutions and discovered a suspicion of autism, with one boy in a more severe form and the other in a milder form. We also underwent genetic testing, but no findings were revealed. This recent year they are waiting for further tests."

5.   Difference between mild and severe forms of autism
"The boy with a milder form of autism strives to compensate for everything (a. n.: he can follow guidance, learn, and adapt), he has a sense of creativity, and can be independent, although trust is challenging. Once, he left home and spent a weekend somewhere - we were worried and searched for him, but he found it amusing. He would like to take a driving test but he has struggled with online theory attempts. He enjoys watching horror movies on TV and follows Messi, aspiring to reach him. He believes that America has better cars, and expresses a desire to go there. The other boy, with a more severe form of autism, is afraid of even a tiny insect. We wish he could communicate basic needs. He takes food on his own. He has distinct preferences - for instance, he asks his father when he needs a drink can to be opened, and asks his mom when he wants a food can to be opened; if we swap roles, he refuses to eat/drink. He had a period of intense interest in cans around the ages of 4 to 7; then, he was fascinated by CDs, colorful and shiny objects. He also likes glow sticks, and we have agreed that he can use two per day. He enjoys blowing bubbles, which he demonstrates when visitors come. He's pleased to gain attention and applause for it. This boy generally struggles more with emotions - calming, comforting, and falling asleep are challenging. It's necessary to know the right techniques for him. For instance, if we are in a store, he might suddenly stop, tilt his head back, and start screaming - they need to take him outside and apply slight pressure to a specific point on his wrist and palms to calm him down. He drinks water, waits for five minutes, and is like a new person. Similarly, in the evening - before he sleeps, massaging a specific point on his feet helps him relax and fall asleep. If this is not done, he comes to seek comfort at night. On TV, he watches very simple, funny, and non-violent things. He doesn't eat with us but joins the table when we finish."
6.   Integration in school and observing challenges
"Children immediately enrolled in a special school; the boy with a more severe form of autism attended an OVI (Special Education Program), and the boy with a milder form of autism was in a program (a. n.: adapted educational program with a lower educational standard).   They had a difficult time adjusting to school. It took them both between one month and one year to get used to the new environment. During this time, they showed disinterest and rudeness. Even later, there were adaptation difficulties, such as withdrawing, and crying.   During lessons, neither of them showed interest in reading and drawing. Everything had to be done through play, with frequent breaks. In such work, planning is challenging (a. n.: success has its ups and downs, and it's unpredictable what the child will excel at and what not)."
7.   Contacts with relatives and parental feelings in this regard
"Some relatives did not understand the children's different behavior and distanced themselves from the family. For us this was not a problem. You love your child; he or she is yours."
8.   Puberty and behavior in school during this period
"During puberty, children became even more prone to crying, withdrawing into themselves, and disliking each other. Their behavior worsened at school – it became somewhat aggressive and peculiar (e. g., licking doorknobs)."
9.   Parents' response to deterioration in behavior
"A pediatric psychiatrist, in collaboration with a clinical psychologist, determined that the boys have attention deficit hyperactivity disorder (ADHD). She prescribed medication for them, but was cautious, advising that they take only the necessary dosage to calm down and focus, as an excessive dose could lead to drowsiness."
10.   Inclusion in another program for one of the boys and observations of both in this program
"Both boys are in OVI (a.n.: a special education program) for two years. It's different here because they protect each other. The boy with milder autism protects his brother with more severe autism - he quickly rushes to him if needed. Both boys now understand things and

events a bit better. Although there are significant variations. The boy with more severe autism had a strong aversion to going to school for some time. We tried to make him think he wasn't going to school but, for example, to a store. He resented this a lot, and it took half a year before he forgot about it. He doesn't forget what you promise him. For instance, if you tell him that he'll get bubbles later, he comes to you and says, "bubbles," to remind you."

11.   Feelings of parents regarding the distinctive behavior of children
"When you live with them, you give a part of yourself – you are a parent, a child, a caregiver. The child gets attached, comes to you, and waits to hear what the teacher (a. n.: the child often sees parents in the role of a teacher) will say. You have to listen to the child. They are very observant to see if you are truly with them, as they might lose trust otherwise. Children quickly sense your emotions; if you're sad, for instance, they come to comfort you and then genuinely smile. Children find it challenging to accept scolding and yelling – in such cases, they get scared, wet the bed, and give you a nasty look. But if you say nicely that they should do better next time, they tend to adhere to it more. It's crucial to know this because otherwise, you won't get anywhere – once they have a habit, they believe they are right. You have to accept the situation as it is. The child psychiatrist believes that time for improvement should slowly stop, allowing them to continue progressing in their development. They will reach their maximum potential. The boy with fewer problems shows signs of facial hair, while the other, with more challenges, does not. The latter generally communicates less – for example, if something hurts, he won't say it directly, and we have to guess. However, this doesn't stop us because they are sweethearts. They don't hide anything. They show what they have done or try to prevent something from going wrong. You just have to be there for them."
12.   Thoughts about the future
"At first, we thought they would stay in school until the age of 18, and then they would go to workshops (a.n.: special centers, where special needs children can work). Now we believe they will stay in school until the age of 26 because it benefits them – they work on self-esteem, practical exercises, and manual skills."
13.   Free time
"Usually, we all go to the store together. They wander around, look at cans if they are of different colors, etc. If mom stays home, they strictly stick to me, and there are no problems. We plan ahead, and if one of them causes trouble, he stays home next time. If they go with just mom, one is lively, and the other one cries."
14.   Parents employment
"I took a job as a family assistant. I had to leave the job market because I needed to be with the children 24 hours a day so that they have not been deprived of anything. Their mother has a disability status, so she cannot take care of them on her own."

In Table 2, we add questions and answers based on the interviewee's narrative, providing additional clarification of his experiences, emotions, and memories.

Table 2: Additional questions for the interviewee, based on his narrative

In your narrative, you mentioned several institutions in which you were involved with your children. Were there any others that you might not have mentioned in the narrative? "In addition to kindergarten, school, developmental clinic, and child psychiatric clinic, for a while, the Social Center also visited our home, providing lay assistance at home. Not anymore now, as the children refused, and they saw, that we handle them as they are."
You mentioned free time spent together with the children, such as going to the store. Do you have other experiences of integrating into the community, for example, involvement in associations? "We also got involved in the municipality when there were workshops held there. Then, we joined a society for people with disabilities. In this case, too, there were occasions of significant resistance from the children, so we stopped. However, we still visit a center where they sell second-hand items. The children enjoy this a lot because these items can be disassembled, repaired, glued, assembled, etc. In general, it is difficult to include children in activities because, on the one hand, they resist, and on the other hand, some organizations do not accept such autistic children for vacations. Once we had everything arranged, but this diagnosis prevented their inclusion."
You mentioned that you are available to the children 24 hours a day, understanding, observing, trying to handle them correctly, accepting them, etc. Do you ever take vacations, free time, or time for yourself? "Actually, no. Only once, when they were in the hospital, I had time for a movie, which I usually can't watch with them. Otherwise, I don't go to therapies or other types of breaks where I could be alone. Of course, you need to be mindful of exhaustion, but I draw energy from faith, and I don't need anything else. In the evening, I have my meditation, which means a lot to me, and I calm down and gather new strength. However, it can be different for other parents. They don't have the energy to take their children out because it's too tiring. Here, it's important to understand that children are deprived if you don't take them out, and you have to accept that. When you manage to do that, you see that it's love and a mission. You have to persevere and recharge your energy. You can't rely on everything, not even on professionals, because there hasn't been enough help here, and it's still a taboo subject. They give you certain guidelines, then you have to continue searching on your own, how you will react, and what the child likes and doesn't like. You can insist on some things and do them, but not everything."
You mentioned that the children were immediately enrolled in a special school. Did you find this okay, or have you ever wished that they could attend a regular school like other children? "On one hand, we found it okay because it's a school that knows how to handle these children. On the other hand, there are no other children for our kids to see or interact with. They might have encountered other children in some places, but in those situations, they fear each other. Even adults are afraid of our children. Therefore, we wished that these programs could sometimes be part of regular primary schools – this way, the children would be under the same roof as others and could get used to each other, like seeing each other during breaks, on the playground, on the bus, etc. It doesn't seem right to us that these children remain unknown, that people wonder about them, are frightened, and don't know how to interact with them."

Table 3 complements the autobiographical narrative with a precise definition of disorders identified for both boys based on the documentation regarding their enrollment in the educational program (considering the most current or latest documentation). The remaining part of the documentation, observations about the child, does not differ from the information in the autobiographical narrative.

Table 3: Precise definition of disorders identified for both boys based on the documentation regarding their enrollment in the educational program

Boy 1	A child with a moderate intellectual disability Long-term illness A child with autistic disorders (A child with moderate limitations in social communication and social interaction; A child with moderate weaknesses in behavior, interests, and activities)
Boy 2	A child with multiple disorders, namely as a child with a moderate intellectual disability and as a child with an autistic disorder.

In the narrative, the father mentioned that Boy 2 has a more severe form of autism, while Boy 1 has a milder form. Boy 1 has newer documentation where the definition is more detailed. The definition also includes attention deficit hyperactivity disorder under the category of long-term illness.

Table 4 contains documentation of the environment, where the family was involved, based on photographs.

Table 4: Environment, where the family was integrated, based on photographs

Choosing a toy at the reuse center.
Train ride.
Buying food and drinks in a store.
Dismantling practical products.

4   Discussion

The literature review provides a framework for understanding the father's role in raising twins with autism and associated challenges. It is evident that the literature addresses topics that frequently arise as issues in raising children with special needs, such as parental collaboration with preschools/school (e. g., Cavnik, 2019), how parents cope with challenges when having children with multiple disorders (e. g.,

Zadravec, 2021), which associations/organizations they can turn to (e. g., Gašparić, 2021), how their lives have changed (e. g., Horvat, 2009), and what is specific to parents of children with autism (e. g., Cugmas, 2018). From the results of hermeneutic analysis, we observed a detailed description of the story from the birth of the twins to present, when they are 15 years old. It covers various phases of life: the birth of the twins and observation of difficulties, monitoring child development in developmental clinics, kindergarten and observation of issues, caring for the child at home and determining diagnoses in institutions, the difference between milder and more severe forms of autism, inclusion in school and observation of challenges, family interactions, puberty and behavior during this period, parental interventions when behavior worsens, the inclusion of the second child in a special education program, parents' feelings about the children's distinctive behavior, thoughts about the future, free time, and parental employment.

The interviewee was consistently optimistic throughout the narrative and eager to share as much information as possible that could be beneficial to the wider public. Certain themes could be identified as reoccurring life patterns. For example, the challenges of the children and parents' responses to them appeared either directly or indirectly in every phase. Reconstructing such patterns highlights the importance of developmental and other issues in adapting the entire lives of parents to their children (Kolarič, 2009). Through analysis, we can vividly understand what this means—constantly searching for the underlying problem and also identifying the causes. The father mentioned that while it is not known for genetics to influence the development of autism, he is now involved in such research for the second time.

It seems that the cause of the children's diagnoses is in a subordinate position to their actual behavioral characteristics. In the actual conversation, the father focused approximately six times on descriptions of the children's behavior – most notably on their crying, screaming, and unpredictability.

In the father's story, a behavioral pattern of the children repeats, where they resist changes and find it difficult to adapt, requiring additional energy from the parents. The father values greatly the fact that he could leave the job market and get employed as a family assistant, especially because his wife, the mother of the twins, wouldn't be able to manage such care on her own due to her disability. He emphasized that such a life is a mission.

The father pointed out that his work is meaningful because he is giving himself for the lives of others. From the literature, we found that other parents have also adapted their lives to their children's special needs, but the authors emphasize more overwhelm and burnout (e. g., Gostenčnik, 2021) than our interviewee. Even from the photos, it is evident that the children enjoy engaging with their surroundings and effectively respond to the environment despite the challenging adaptation.

Some authors, for example, Kovačič Purgaj (2018), report that Parents emphasized the need for more support from the environment, either professional or other, such as parents of children with special needs. However, our interviewee differs in this aspect, as he believes that while professionals can provide guidance, the real work on specific approaches and methods to calm the child must be done by the parents themselves.

Regarding the question of inclusion, we obtained similar data like Topolovec and Schmidt (2015). The interviewee thought it would be better if special and adapted programs for children with special needs were integrated under the same roof as regular elementary school programs.

The answer to what exactly helps our interviewee overcome the stresses and challenges of everyday life is revealed in the narrative, where he expressed the importance of faith or evening meditation. This aligns with the findings of Zadravec (2021), who explored factors influencing the mental well-being of parents in her research. One might expect that the father, caring for the twins and his wife with disability, would be highly burdened and possibly pessimistic. However, quite the opposite is true, demonstrating a high degree of resilience and strength. It was crucial for him that autism was diagnosed early, allowing for timely support and assistance in the developmental clinic (Šnopl, 2009).

The definitions of children's diagnoses (Table 3), extracted from the documentation, indicate that the challenges are highly complex, and the way the father describes caring for the children, is even more encouraging from this perspective. The photographs depicting their involvement in the environment (Table 4) further confirm that life with such significant challenges can be beautiful – if it is filled with love, as our interviewee expressed.

5   Conclusion

In a nutshell, the result of the study is the father's experience in caring for twins with autism and associated issues, including the below highlights, values, attitudes, or guidelines.

- Early detection of children's special needs is crucial. Experts can provide diagnoses and guidance, but parents regulate care, respond to maladaptive behavior, manage sensitivity to environmental stimuli, etc., which are characteristic of these children, the latter requiring concentration, calmness, patience, courage, and perseverance to integrate children into society.
- Despite limitations in certain activities for children with autism (e. g., not being able to go to the seaside with a group of other children), individual experiences should be facilitated to the extent each child can handle.
- Autism manifests in milder and more severe forms, so it is necessary to understand each child individually; it can coexist with other disorders (in our case study, alongside attention and hyperactivity disorder and mental disorder); its impact can also vary across different life stages (in our case study, behavior worsened during puberty).
- Living with special needs children is unpredictable because certain achievements, that have been reached, are relative. A particular stimulus can again threaten the child to such an extent, that recovery may take a long time.
- Children with autism need to be provided with support, withdrawal, time for rest and calming. We cannot expect them to be like others and they need to be accepted as they are.
- Being a parent to a child with special needs means a mission and self-sacrifice. Acceptance of this situation is a better solution than fighting against it, denying the problem, escaping into other issues, etc. The parents need to support each other in this, even though both may not be able to participate equally in every aspect with the child. They must do their best in their capacities.

The limitation of the study is that the results cannot be generalized because it is a case study. The contribution to the scientific field is that this method complements other data with specific insights from experiences, memories, and first-person

narratives. Such a case study can be replicated in other atypical cases of parents caring for children with special needs, which can collectively provide more opportunities to understand their situations. All of this forms the basis for practices to meet the needs of these families and for professionals, involved in the reform of the national education programs, to consider individualization in all approaches for children, youth, and their families with additional needs and abilities.

References

Cavnik, A. (2019). *Sodelovanje z družino ključni dejavnik uspeha zgodnje obravnave otroka s posebnimi potrebami* [*Collaboration with the family is a key factor in the success of early intervention for a child with special need*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=75579

Cugmas, Z. (2018). Navezanost na starše pri otrocih z motnjami avtističnega spektra (MAS) [Attachment to Parents in Children with Autism Spectrum Disorders (ASD)]. *Pedagoška obzorja, 33*(2), 52–63.

Gašparić, L. (2021). *Strokovna in interesna združenja za otroke z motnjo avtističnega spektra* [*Professional and Interest Associations for Children with Autism Spectrum Disorder*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=78338

Gostenčnik, J. (2021). *Spremembe življenjskih vzorcev družine z otrokom z avtizmom* [*Changes in Family Life Patterns with a Child with Autism*] [Magistrsko delo, Univerza v Ljubljani]. Fakulteta za socialno delo, Univerza v Ljubljani. https://repozitorij.uni-lj.si/IzpisGradiva.php?lang=slv&id=124406

Hartman, T. (2022). *Načrtovanje dela inkluzivnih pedagogov z otroki s posebnimi potrebami* [*Planning the Work of Inclusive Educators with Children with Special Needs*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=81429

Horvat, A. (2009). *Otrok s posebnimi potrebami (avtizem)* [*Child with Special Needs (Autism)*] [Diplomsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=12087

Jereb, S. (2020). *Stališča vzgojiteljev in staršev do zgodnje obravnave otrok* [*Attitudes of educators and parents towards early intervention for children*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=78172

Kolarič, J. (2009). *Življenje družin z otroki z motnjami v duševnem razvoju, vključenimi v Dnevni center Maribor - Organizacijska enota ZUDV Dornava* [*Life of families with children with intellectual disabilities involved in the Daily Center Maribor - Organizational unit ZUDV Dornava*] [Diplomsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=10605

Korpar, M. (2021). *Komunikacija med vzgojitelji in starši otrok s posebnimi potrebami v rednih oddelkih vrtcev v Mariboru in okolici* [*Communication between educators and parents of children with special needs in regular kindergarten classes in Maribor and the surrounding area*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=79396

Kovačič Purgaj, V. (2018). *Študija zadovoljitve potreb družin otroka s posebnimi potrebami* [*Study of satisfaction with the needs of families of children with special needs*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=70168

Kozel, S. (2021). *Stališča staršev predšolskih in osnovnošolskih otrok do inkluzije v vzgoji in izobraževanju* [*Opinions of parents of preschool and elementary school children about inclusion in education and upbringing*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=80988

Krivec, K. (2016). *Stališča staršev predšolskih otrok do vključevanja otrok s posebnimi potrebami v redne oddelke vrtca* [*Opinions of parents of preschool children about the inclusion of children with special needs in regular kindergarten groups*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=60698

Ličen, N. (2013). Paradoksi narativne metode pri raziskovanju učenja in situ [The Paradoxes of Narrative Method on Learning in Situ]. *Andragoška spoznanja, 19*(3), 31–45.

Makoter, S. (2020). *Primernost poučevanja otrok s posebnimi potrebami v rednih oddelkih po ocenah učiteljev in vzgojiteljev v prvem razredu* [*Appropriateness of Teaching Children with Special Needs in Regular Classrooms: Teachers' and Educators' Assessments in the First Grade*] [Diplomsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=76184

Nölke, E. (1999). Rekonstruktivna hermenevtična analiza biografij v socialnopedagoškem delu [Reconstructive Hermeneutic Analysis of Biographies in Social Pedagogical Work]. *Socialna pedagogika, 3*(4), 425–444.

Pajnik, M. in Bajt, V. (2009). Biografski narativni intervju: Aplikacija na študije migracij [*Biographical Narrative Interview: Application to Migration Studies*]. *Dve Domovini*, (30). 69–89.

Plešec, N. (2021). Sodelovanje šolske svetovalne službe s starši otrok s posebnimi potrebami [Collaboration of the school counseling service with parents of children with special needs]. *Socialno delo, 60*(4), 347–358.

Rapuš Pavel, J. (2022). Biografski pristop pri socialnopedagoškem delu [Biographical approach in social pedagogical work]. In D., Zorc Maver (ur.). *Inovativno učenje in poučevanje za kakovostne kariere diplomantov in odlično visoko šolstvo*, (pp. 201–217). Univerza v Ljubljani, Pedagoška fakulteta. Prva e-izdaja. DOI: 10.51746/9789617128222

Šnopl, V. (2009). *Mnenja staršev o podpori, obravnavi in izobraževanju otrok z avtizmom* [*Parental opinions on support, treatment, and education of children with autism*]. [Diplomsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/Dokument.php?id=9387&lang=slv

Topolovec, U. in Schmidt, M. (2015). Šolanje osnovnošolcev s posebnimi potrebami [Education of elementary school students with special needs]. *Pedagoška obzorja, 3*(3/4). 3–18.

Zadravec, M. (2021). *Psihološko blagostanje, stres in vključenost v šolanje staršev otrok s posebnimi potrebami* [*Psychological well-being, stress, and involvement in schooling of parents of children with special needs*] [Magistrsko delo, Univerza v Mariboru]. Digitalna knjižnica Univerze v Mariboru. https://dk.um.si/IzpisGradiva.php?lang=slv&id=78733

WEBSITES ACCESSIBILITY OPTIONS FROM THE PERSPECTIVE OF THE VISUALLY IMPAIRED

TOMAŽ BRATINA,[1] TINA KOLARIČ[2]
[1] University of Maribor, Faculty of Education, Maribor, Slovenia
tomaz.bratina@um.si
[2] Minka Namestnik-Sonja Elementary School, Slovenska Bistrica, Slovenia
tina.kolaric@student.um.si

In an effort to improve digital accessibility, the European Parliament has mandated the adaptation of public websites and mobile applications for the blind and visually impaired. This study evaluates the accessibility options used on selected public websites from the perspective of visually impaired people and shows that text size adjustment, keyboard navigation and eReader support are the most common options. For eReading, challenges remain in language support, and for PDFs, in content recognition, both of which underline the need for advanced AI solutions. However, colour contrast options are surprisingly less common, indicating a discrepancy between digital and physical accessibility solutions. Features such as link highlighting and dyslexia-friendly settings are less relevant for the visually impaired but benefit other user groups, highlighting the importance of a diverse range of accessibility options. Further research is recommended to determine the optimal colour contrasts and to refine accessibility features based on broader user feedback, with the goal of creating a more inclusive digital environment for all, including those with hearing or mobility impairments.

University of Maribor Press

Možnosti dostopnosti na spletnih straneh z vidika Slabovidnih

Tomaž Bratina,[1] Tina Kolarič[2]

[1] Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
tomaz.bratina@um.si
[2] Osnovna šola Minke Namestnik-Sonje, Slovenska Bistrica, Slovenija
tina.kolaric@student.um.si

V prizadevanju za izboljšanje digitalne dostopnosti je Evropski parlament odredil prilagoditev javnih spletnih mest in mobilnih aplikacij za slepe in slabovidne. V prispevku z vidika slabovidnih ljudi ocenjujemo možnosti za dostopnost, ki se uporabljajo na izbranih javnih spletnih mestih. Ugotavljamo, da so najpogosteje uporabljane možnost prilagoditev velikosti besedila, navigacija s tipkovnico in uporaba e-bralnike. Pri e-branju je izziv jezikovna podpora, pri datotekah PDF pa prepoznavanje vsebine, pri čemer se kaže potreba po naprednih rešitvah umetne inteligence. Možnosti barvnega kontrasta so presenetljivo redko uporabljene, kar kaže na neskladje med digitalnimi in fizičnimi rešitvami dostopnosti. Funkcije, kot je označevanje povezav in disleksiji prijazne nastavitve, so manj pomembne za slepe in slabovidne, vendar koristijo drugim skupinam uporabnikov. Slednje kaže na pomen raznolikih možnosti dostopnosti. Potrebno bo najti optimalne barvne kontraste in izboljšati funkcije dostopnosti na podlagi obsežnejših povratnih informacij uporabnikov, da bi ustvarili še bolj vključujoče digitalno okolje.

1   Introduction

Accessing information and public services from the Internet has become an integral part of daily life, facilitated by the use of stationary and mobile devices. This constant availability transcends time and location constraints. The only condition is the availability of the network. While obtaining information and utilizing public services is typically seamless, challenges emerge when considering individuals with special needs. Owing to their unique circumstances and limitations, it is imperative to incorporate this demographic into the framework of accessible information and services, providing tailored accessibility solutions.

In 2016, the European Parliament addressed this issue by adopting a directive on the accessibility of websites and mobile applications for public sector bodies (Csontos & Heckl, 2021). The aim is to enhance access for all European Union citizens, particularly those with special needs (Accessibility of public sector websites and mobile apps, 2021). Guidelines for accessibility were developed by Kirkpatrick, O'Connor, Campbell & Cooper (2023), encompassing a diverse group, including individuals who are blind or visually impaired, deaf or hard of hearing, or who have physical disabilities, speech disabilities, cognitive impairments, sensitivity to photographs, or a combination of these. The accessibility options are categorized as A, AA, and AAA levels, with the latter indicating greater success in terms of website accessibility.

2   Accessibility Quality Assessment

The primary objective of incorporating accessibility options is to empower individuals with disabilities, ensuring they can access information from the Internet in a user-friendly and accessible format. The significance of this accessibility is particularly pronounced when it comes to information from public authorities and websites within the public sector (Konvencija o pravicah invalidov, n.d.). This includes crucial areas such as employment, education, banking, health services, and other online economic services, where individuals with disabilities should have equal access to submit applications (Lewthwaite and James, 2020).

In essence, the emphasis lies not on the specific website utilized by individuals with disabilities, but rather on the paramount importance that the website itself be designed and maintained to be fully accessible to this demographic.

The basic criteria for accessibility are as follows:

- level A: keyboard accessibility, use of audio, pausing of video content, possibility of using colours, alternatives to text content, setting of font size and format as well as the possibility of spacing and alignment of the font,
- level AA: Audio subtitles for live recordings, audio descriptions for recorded video content, contrast, navigation, logical sequence of content, clearly labelled titles, and
- level AAA: audio description, sign language interpretation for audio or video content and no time limit (Kirkpatrick, O Connor, Campbell & Cooper, 2018; Accessibility of public sector websites and mobile apps, 2021).

Level A represents the fundamental requirements essential for a website to achieve accessibility, serving as the foundation for inclusivity. Failure to meet these criteria renders the website entirely inaccessible (Introduction to Web Accessibility, n.d.). At this level, key provisions include text alternatives for non-text content, pausing video content, accommodating colour usage, ensuring sound usage is compatible, and facilitating keyboard navigation (Kumar, Divya Venkatesh & Biswas, 2021).

Moving to Level AA, the focus is on addressing the major barriers faced by individuals with disabilities. At this stage, the most significant accessibility challenges (Introduction to Web Accessibility, n.d.) should be eliminated. Level AA necessitates meeting Level A requirements while incorporating additional features such as audio subtitles in live recordings, audio descriptions, text contrast, and text resizing (Kumar, Divya Venkatesh & Biswas, 2021).

The AAA level represents the highest tier, posing greater challenges for websites to attain. Although reaching this level is desirable, it is not mandatory. Lorca, de Andrés, and B. Martínez (2018) propose that a website achieving all accessibility options at the AA level, with only one at the A level, would receive an A rating.

2.1 Accessibility and customization options

2.1.1 Keyboard accessibility

Keyboard accessibility implies that users can navigate the website solely using the keyboard, eliminating the need for a mouse. It is important that the website be clearly designed, transparent and follow a logical sequence. The keyboard focus should be evident, ensuring users are aware of their location within the interface (Making the Web Accessible, 2022; Accessible Technology, 2022). If the website has this accessibility option, it has achieved level A, and if there is no time limit on when the user has to press the button, it has achieved level AAA (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.2 Navigation

The drop-down menu or navigation is an accessibility option ensuring that the data is organised and collected in a meaningful way. It is important that the headings and subheadings are written in a hierarchical and meaningful way. Employing visual cues such as underlining or bold text enhances clarity. Additionally, differentiating colours for headings and subheadings upon clicking aids users in recognizing visited or viewed content (Accessible Technology, 2022; Radovan & Perdih, 2016). It is also important that we can move freely while navigating and do not have to go from word to word and that the content below the navigation does not remain visible (Making the Web Accessible, 2022). Navigation reaches level AA when it always appears in the same order (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.3 Font customization

There are two options for customising font: font type and format and font size. The most common font size on websites is size 12, and the user should be able to increase this further. For the font, the user can choose between three fonts: Times New Roman, Arial and Helvetica. These fonts are not decorated, so they are easier for the user to read (Radovan & Perdih, 2016). The website reaches AA level if the font, images and text do not overlap when enlarged. However, if the website has the option to remove parts of the content, the title names achieve level AAA. Part of

the content is removed to make it understandable for people with limited cognitive abilities (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.4 Colour customization

Including colour choice among the accessibility options is essential, allowing users to customize both font and background colours based on individual preferences. This feature elevates the website to the highest accessibility level, AAA. In the event that the website already has pre-selected colour contrasts, it achieves the AA level (Accessible Technology, 2022). It is recommended that colour contrasts in pastel colours be proposed in advance (Making the Web Accessible, 2022).

2.1.5 Text Spacing & Alignment

For the AA standard, it is recommended that line spacing should be set at least 1.5 times the font size. Similarly, spacing between paragraphs should be twice the font size, according to accessibility guidelines (Making the Web Accessible, 2022). Adequate line spacing significantly improves readability and reduces the likelihood of letter confusion for users (Radovan & Perdih, 2016).

In addition, according to the AA standard, letter spacing should be at least 0.12 times the font size, and word spacing should be 0.16 times the font size (Making the Web Accessible, 2022). These specifications contribute to an inclusive and user-friendly design that accommodates a diverse range of users.

2.1.6 Link Tags

Within the website we can also see various links. If the content is out of context and it would be beneficial for the user to learn something about it, it would be useful to be able to click on it. It is important that links to new information be visually highlighted, can be coloured, have an additional character or take a different form (Making the Web Accessible, 2022). The website reaches the AAA level when the link is in context with the text - it is complementary (Kirkpatrick, O Connor, Campbell & Cooper, 2018).

2.1.7 Switch off animations and flashing effects

A website that contains no flashing content achieves level AAA. Level A is achieved when the flashing content is dimmed and limited to a smaller area (Accessible Technology, 2022). It is recommended that users have the ability to control moving content, such as videos, advertisements, scrolling sources, etc. The easiest strategy for websites is to avoid such content (Making the Web Accessible, 2022).

2.1.8 Audio and video content

Video content that is accompanied by a description below the image achieves accessibility level A. The exception is live video content with subtitles, which achieves level AA. For the highest accessibility level, AAA, sign language interpretation is required (Kirkpatrick, O'Connor, Campbell, and Cooper, 2018). To improve the user experience for both audio and video content, creators are advised to use high-quality microphones and recording software, ensuring cleaner recordings free from background noise.

If background noise or music is incorporated, it should be at least 20 decibels quieter than the spoken content in the foreground. In addition, the background elements should not contain repetitive patterns and high-pitched sounds. The speaker in the foreground should deliver the content clearly and deliberately and at a moderate pace. Topics should also include pauses so that users have time to process the information (Kirkpatrick, O'Connor, Campbell & Cooper, 2018).

3 Blind and visually impaired

The predominant way of presenting information and services online is through written content such as descriptions, instructions and links. However, this format presents a significant barrier for people with visual impairments or blindness. To overcome this challenge, it is important to make customised accessibility adaptations based on each person's level and type of impairment.

3.1   Degrees of blindness and visual impairment

People with visual impairments are categorised as blind and visually impaired. The degree of impairment depends on how much information they can take in with the help of their vision (Albrecht et al., 2016). The boundary between visual impairment and blindness, regardless of visual acuity, is a visual loss of 95% or a visual field narrowed by less than 10 degrees around the fixation point. Normal visual acuity is 100% or 0.1. When determining whether a person is blind or visually impaired, the visual acuity of the better eye is taken into account in order to achieve a better correction (Okvare vida, 2022). It is a mistake to believe that only people who are completely visually impaired are classified as blind. We also classify people with residual vision of up to 5% as blind. However, such low residual vision does not enable people to orient themselves independently (Okvare vida, 2022).

Visual impairments (2022) are categorised according to visual acuity:

Visual impairment:

Category 1: visual acuity from 0.3 to 0.1
Category 2: Visual acuity of less than 0.1 to 0.05, or a restricted field of vision around the fixation point of 20 degrees or less, regardless of visual acuity.
Blindness:
Category 3: A visual acuity of less than 0.05 to 0.02 – or a field of vision around the fixation point restricted to 5-10 degrees, regardless of visual acuity.
Category 4: A visual acuity of less than 0.02 - or a restriction of the field of vision around the fixation point to up to 5 degrees, regardless of visual acuity.
Category 5: visual acuity 0 – Light perception is negative.

3.2   Types of visual impairment

3.2.1   Myopia and hyperopia

Near-sightedness or myopia is a visual impairment in which people have difficulty seeing things at a distance. People with this visual impairment see objects in the distance blurred (Central Vision Loss: Causes, Diagnosis, and Treatment Options, 2022). Farsightedness, or hyperopia, is a visual impairment in which people have

difficulty seeing things up close. Objects viewed up close by a person with this visual impairment appear blurred and distorted. What both types of visual impairment have in common is that those affected can receive help from glasses or contact lenses, in some cases with surgery (Accessible Technology, 2022). Damage to the macula, which is essentially related to the ageing process, can lead to a deterioration in visual acuity (Refractive Errors, 2022). ADM often occurs in older people but does not lead to complete blindness. However, the loss of vision can make it difficult to look at faces, read, write, drive, cook and clean the house (Refractive Errors, 2022; Eye Diseases & Conditions, n.d.).

3.2.2   Strabismus

Visual impairments also include squinting or strabismus (Common Eye Disorders and Diseases, 2022). Strabismus is a term for eyes that are not properly aligned, which can lead to double vision and blurred vision (Eye Diseases & Conditions, n.d.). Strabismus can cause the eyes to turn inward or outward. This is due to a lack of coordination between the eyes. The brain can learn to ignore one of the eyes, which in turn can lead to permanent loss of vision in that eye (Common Eye Disorders and Diseases, 2022).

3.2.3   Cataracts

Cataracts prevent or block light from entering the eye in one or both eyes. Vision may become blurred or cloudy, and double or ambiguous vision may occur. People with cataracts may also see a yellowish spot in the pupil (Eye Diseases & Conditions, n.d.). There are varying degrees of visual impairment in cataracts, which leads to impaired quality of life (Abuaddous, Jali & Basir, 2016).

3.2.4   Diabetic retinopathy

Diabetes mellitus is on the rise worldwide, and it is predicted that the number of diabetics will increase to 439 million adults worldwide by 2030 (Afarid et al., 2022). Diabetic retinopathy can occur in people with diabetes. Diabetic retinopathy is a common complication of diabetes. It is characterised by progressive damage to the blood vessels of the retina. Diabetic retinopathy progresses through four stages – from mild to moderate and severe to the most advanced stage (Common Eye

Disorders and Diseases, 2022). Symptoms that sufferers may not notice until later include blurred vision, floating spots, sudden loss of vision in one eye, flashing lights, poor night vision and colour vision (Eye Diseases & Conditions, n.d.).

3.2.5   Glaucoma

The next form of visual impairment is glaucoma or green cataract. Glaucoma is a serious, lifelong eye disease that can lead to vision loss and blindness due to damage to the nerves at the back of the eye (Refractive Errors, 2022). However, glaucoma does not necessarily lead to blindness as it can be controlled by modern treatments (Eye Diseases & Conditions, n.d.). Because glaucoma is asymptomatic at first, half of people do not even know they have it. Over time, however, it can lead to a slow loss of vision, usually in the area by the nose (Refractive Errors, 2022).

3.2.6   Amblyopia and colour blindness

Amblyopia, also known as lazy eye, is a form of visual impairment that occurs when the vision in one eye deteriorates because of a lack of coordination between the eye and the brain. Over time, the brain tends to rely more on the stronger eye, leading to a gradual weakening of vision in the affected eye (Refractive Errors, 2022). Typically, amblyopia manifests itself in one eye, more rarely in both eyes (Common Eye Disorders and Diseases, 2022).

Colour blindness, or the absence of colour vision, encompasses various problems that people may have in perceiving colours (Eye Diseases & Conditions, n.d.). In addition, there is a particular condition that involves degeneration of the retina and is classified as a rare eye disease. This disease is characterised by the gradual breakdown of retinal cells, resulting in vision loss. It is important to note that this visual impairment is genetically inherited, i.e., those affected are born with this disease (Refractive Errors, 2022).

3.2.7   Central and peripheral visual field defect

Visual field defects are also one of the most common visual impairments. There are two types of visual field loss: central and peripheral. Central visual field defects affect near vision and peripheral visual field defects affect distance vision (Visual field

defects: causes, treatment and help, 2023). Peripheral visual field loss occurs when a person can only see objects that are directly in front of them. The person can only see what is in the centre of the visual field, but not everything around it (Griff, 2020). Central vision accounts for only 3% of the total visual field, but is important for recognising the details of objects and judging distances (Central vision loss: causes, diagnosis and treatment options, 2022).

3.3 Accessibility of selected public websites

Based on the accessibility assessment guidelines and the most common needs of blind and visually impaired people, we have selected three websites that offer different accessibility options but at the same time differ in their objectives. We selected the following websites: Maribor Pharmacies, the Municipality of Maribor, and the Pension and Disability Insurance Institute of Slovenia. The selection is based on the significant number of options for accessing and offering public information that is important for all citizens. We have also included pages with content specifically intended for the blind and visually impaired, such as the Association of Blind and Visually Impaired Societies of Slovenia, the IRIS Centre, and the Institute for Blind and Visually Impaired Youth Ljubljana.

3.3.1 Website of the Municipality of Maribor (Mestna občina Maribor)

The website of the Municipality of Maribor is characterised by its sophisticated design and comprehensive range of information. The website skilfully presents a wealth of data without overwhelming the user, ensuring a well-organised and user-friendly experience. The introductory video showing the Maribor city administration can be paused, which is rare for most websites. The headings are clearly visible, as they are enlarged and in bold font. Also interesting is the use of icons that can be used instead of text. This clearly explains the content that may be of interest to us. If we want to click on them, they are outlined in red. The links we want to click on are also red. The lack of live audio and video content does not detract from the quality of the website. Instead, the available multimedia content is subtitled and accompanied by sound.

The website offers various accessibility options such as text zoom, contrast, text spacing, stop animations, text alignment and line height adjustment. It also includes accessibility features such as changing the cursor, highlighting links, screen hinting and colour saturation, which, although not explicitly listed in the evaluation criteria, are consistent with established guidelines and are increasingly recognised as essential components of accessible design.

3.3.2   Maribor Pharmacies (Lekarne Maribor) Website

The website of Maribor pharmacies is very diverse, as it offers a great deal of information at once. Since it is a website where most of the products are sold, the content is also effectively enriched by visual material. Headings and subheadings are bold and clearly labelled. Under the accessibility options, we have two options to increase or decrease the font size, either by clicking with the mouse or by using the keyboard. In the options we also find a colour scheme that is very vivid, although most of the recommended colours are pastel contrasts.

Finally, we can choose between different fonts, and among the options for different fonts we also find a dyslexia aid. In general, you could say that there are not many accessibility options on this website, and that's not a bad thing. However, in such a case, the accessibility options must be of high quality, perfected and chosen wisely.

3.3.3   Website of the Pension and Disability Insurance Institute of Slovenia (Zavod za pokojninsko in invalidsko zavarovanje Slovenije)

At first glance, the website of the Slovenian Pension and Disability Insurance Institute is quite diverse, as it offers a wide range of information. This is because the website has no navigation, i.e., if we want to know more about the content, we simply click on it. It is therefore understandable that the website offers all the information at once. The headings are clearly visible and in blue or white. We can also click on them. You could say that they have replaced accessibility with "highlight links."

The website also has an eReader and a sign language function. With the eReader, we can choose between three readers: two female voices and one male. The interpreter presents the content in sign language. This also includes subtitles. In total, there are

42 recordings that offer sign language. At the same time, the website has other accessibility options, such as a choice of font size, font type and colour scheme. With all three options, the user can choose from more options than with most other sites.

4 Methodology

In this study, as a first step, three websites were selected to be evaluated by blind and visually impaired individuals. These websites were selected based on their compliance with the accessibility guidelines recommended by the World Wide Web Consortium (W3C) as described by Kirkpatrick, O'Connor, Campbell, & Cooper (2018). The aim was to evaluate websites with different levels of accessibility: one with poor accessibility, one with satisfactory accessibility, and one with good accessibility. However, after reviewing the literature and guidelines, this approach was deemed ineffective. It was therefore decided to examine three websites, all of which were considered to have good accessibility but differed in their offerings. The main criterion for selecting these websites was the variety of accessibility options they offer. Despite the diversity of their accessibility features, the websites differed from each other as they offered different types of accessibility support. A third criterion was the relevance of these websites to blind and visually impaired users, including websites related to community services, healthcare and social issues.

4.1 Purpose

Based on the selected websites of public service providers, the aim of the study is to create a list of these options and to determine which accessibility options are actually meaningful and useful from the perspective of blind and visually impaired people. We asked the following research questions:

1. Which accessibility options are most commonly used by blind and visually impaired people?
2. Which accessibility options most benefit blind and visually impaired people?
3. Which adaptations are of less benefit to blind and visually impaired people?
4. What new accessibility options would you like to see?

4.2   Data collection

We reviewed the websites of public service providers that offer the widest range of accessibility options. These included the websites of Maribor Pharmacies, the Municipality of Maribor and the Pension and Disability Insurance Institute of Slovenia. We selected a number of adaptations and assessed which adaptations were appropriate and useful based on the opinions of blind and visually impaired people. For data collection, we chose an online questionnaire, which was provided to respondents with the help of specialised institutions for the blind and visually impaired and via the e-mail addresses of personally known blind and visually impaired people.

The evaluation of websites was carried out by visually impaired participants in the sample.

4.2.1   The description of the instrument

The questionnaire began with the respondents being familiarized with the purpose of the study in the introduction and assured of anonymity. The first part of the questionnaire contained questions about gender, age and information about the respondent's visual impairment. This was followed by instructions on how to rate websites, emphasizing that ratings should be given from the perspective of personal experience with the accessibility options of the website in question. Respondents visited the website via the link provided. For each website evaluated, two sets of questions were prepared relating to the usability of the website for visually impaired individuals and the evaluation of the accessibility options implemented.

In the usability section, the clarity, readability, text spacing, text alignment, appropriateness of colours, functionality of links, navigation, possible animations, visibility of the accessibility options button, and assessment of suitability for visually impaired people were evaluated.

In the section on evaluating accessibility options, the questions focused on evaluating the usability of accessibility features, specifically colour schemes and contrast, font, font size, text spacing, control over animated content, visibility of links, text alignment, availability and quality of eReaders, and mouse pointer size

adjustment. We then provide a list of accessibility options used by visually impaired users so that we could determine which options are frequently or rarely used.

4.3   Sample

The sample comprises 50 blind and visually impaired people in Slovenia. The age structure of the sample includes people aged 21 to 30 years (32%), people aged 31 to 40 years (26%), people over 51 years of age (22%), people aged 41 to 50 years (16%), eight people aged up to 20 years (2%). The sample is gender-neutral. The data collected was processed using the SPSS programme. We used basic descriptive statistics and selected non-parametric tests.

5   Results

5.1   Using accessibility options

Websites offer various accessibility options that do not benefit visually impaired and blind people equally or are used infrequently. Table 1 shows the frequency of use of accessibility options as reported by blind and visually impaired people. Only valid responses were considered.

Table 1: Use of accessibility options

Accessibility options	f	f %
Adjustment of text size	12	38.7
Automatic reading of texts (eReader)	7	22.6
Keyboard only (do not use mouse)	6	19.4
Contrast and colour palette	3	9.7
Highlighting of links	1	3.2
Pointer size	1	3.2
Text spacing and alignment	1	3.2
Total	31	100.0

According to blind and visually impaired people, the most common accessibility option is the ability to change the size of the text; in this case blind and visually impaired people increase the size. The result is not surprising, as we know that blind and partially sighted people often enlarge the text on their phone or computer. In practice, we also find that some people use lenses even though the text on the phone or computer is already magnified. Magnifiers are also used when reading books,

magazines and newspapers, but for some people magnifiers are insufficient. Radovan & Perdih (2016) found that blind and visually impaired people do not use font sizes smaller than 12.

This is followed by the customisation option with the option to read the text or the eReader widget. This is an accessible option where a voice reads the text out loud. It is one of the options that benefits blind and visually impaired people the most and makes it easier for them to access information, but unfortunately it is rarely available. Accessible Technology (2022) has described this accessibility option as an alternative way of obtaining information.

The accessibility option, which allows navigation using only the keyboard without relying on a mouse, is the third most frequently used adaptation. It is recognised by various authors (Making the Web Accessible, 2022; Accessible Technology, 2022) as one of the most important adaptations for blind and visually impaired people, and its effectiveness depends on the logical arrangement of the website design. Designers must take special care to ensure that frames are used effectively. Frames around images, titles or links provide effective guidance. Alternatively, various design solutions, such as changing the colour of text, using signals, or using other unique markers, can serve the same purpose. This accessibility option is particularly valuable, as it not only helps keyboard users but also provides visual cues to mouse users, improving the overall user experience. However, the relatively low frequency of use is notable, since blind and visually impaired people often face problems navigating websites.

Contrast and colour-changing options are common in physical environments but are rarely used by blind and visually impaired people when it comes to digital interfaces. This unexpected result may stem from the challenges associated with the differences between the screen and the physical environment, including potential issues with colour intensity or palette. In addition, the complicated relationship between colours and contrasts can make it difficult to concentrate. When comparing the use of color-coded markings in public spaces, city centres, schools and facilities for people with special needs with the limited use of similar options in digital environments, the reasons for this discrepancy could be complex. These could include potential challenges in effectively replicating contrast strategies in the real world on digital platforms.

Table 2: Use of accessibility options according to the degree of visual impairment

Accessibility options	Type of visual impairment		
	Impaired	Blind	Total
Highlighting of links	1 (5.3%)	0 (0.0)%	1 (3.2%)
Adjustment of text size	8 (42.1%)	4 (33.33)	12 (38.7%)
Pointer size	1 (5.3%)	0 (0.0%)	1 (3.2%)
Text spacing and alignment	1 (5.3%)	0 (0.0%)	1 (3.2%)
Contrast and colour palette	2 (10.5)	1 (8.3%)	3 (9.7%)
Keyboard only (do not use mouse)	3 (15.8%)	3 (25.0%)	6 (19.4%)
Automatic reading of texts (eReader)	3 (15.8%)	4 (33.3%)	7 (22.6%)
Total	19 (61.2%)	12 (38.7%)	31 (100.0%)
χ^2=4,407, df=7, p>.05.			

The table shows the results of the most frequently used accessibility options depending on the degree of visual impairment. There are no statistically significant differences between the categories (P = 0.625) in the use of the accessibility option, indicating that the frequency of use of the option is independent of the degree of visual impairment. There are differences only for certain accessibility options. The table shows that more visually impaired people (42.1%) than blind people (33.3%) use the option to change the text size more frequently. We expect this to increase. The eReader option is the second most frequently used option, used more often by blind people (33.3%) than by visually impaired people (15.8%).

A comparison of the two most frequently used accessibility options yields the expected result. It is easier for visually impaired people to read enlarged text, while audible information is more helpful for blind people. The fact is that blind people, even those with low residual vision, find it difficult or impossible to read the text, while hearing makes this task much easier for them.

Both blind and visually impaired people make equally frequent use of the option to use only the keyboard without using the mouse at the same time. This shows that both categories of people benefit equally from this accessibility option.

The table shows the accessibility options that are used only by visually impaired people. These are changes to the colour scheme/contrast, highlighting links, cursor and text spacing. The option to change the contrast is used only by a blind person, which leads us to the conclusion that this case involves a person with some residual

vision. The significance of the result is limited, as we cannot assume that this option is only used by blind people because of the small sample.

From the results, we conclude that regardless of whether a person is blind or visually impaired, similar accessibility options are used. This basically makes sense because there is a small difference in the percentages of people depending on their level of visual impairment. But at the same time, these percentages are very important for visually impaired and blind people. As Albrecht et al. (2016) stated, blind and visually impaired people perceive the environment differently, from which we conclude that they also perceive the web differently, since people with very low residual vision have difficulty orienting themselves (Okvare vida, 2022). On this basis, we can better understand why the difference is statistically significant.

5.2   Least used accessibility options

As the range of accessibility options is extensive and is not exclusively aimed at blind and visually impaired people, we were interested in which accessibility options blind and visually impaired people use less frequently. Blind and visually impaired people state that they use the following accessibility options less frequently:

- the text alignment setting.
- the line height settings,
- the option to change the mouse pointer/cursor,
- the option to highlight links,
- the screen tip option,
- the dyslexia-friendly option,
- the option to interpret information in sign language

We note that blind and visually impaired people do not benefit from a different font, although the literature claims that the dataset should be left-aligned. Even the possibility of adjusting line height does not help these people to read, as one would otherwise expect. Changing the mouse pointer only confuses blind and visually impaired people, as they first have to change the shape of the mouse pointer before they can use it. However, this change is not so important as to make a further contribution to accessibility. We were very surprised that one of the rarely used

options is the option to select links. The latter option allows a blind or visually impaired person to quickly recognise links that lead to another website. When you select a link, a new online window usually opens, which is unfavourable for blind and visually impaired people. Better visibility of the link would therefore prevent unintentional switching to another website. The ScreenTip for the blind and visually impaired is more of a nuisance than an advantage and distracts attention with its appearance, because when this option is used, a box opens showing what content will appear when the user clicks on it. It is therefore not surprising that this accessibility option is rarely used. Dyslexia-friendly options and the interpretation of information in sign language are not intended for this group of people in terms of functionality alone and are therefore used infrequently or not at all.

Despite the fact that blind and visually impaired people do not use some accessibility options, these cannot be removed from the set. In addition to blind and visually impaired people, websites are used by other people with special needs, so these accessibility options are easier for them to use. Therefore, we believe that every group of people with disabilities deserves research in the field of accessibility options and that in practice, it should be directly investigated which accessibility options benefit a particular group and which do not. Only on the basis of research and results can various accessibility options be added or restricted.

5.3 Suggestions for new accessibility options

When asked for suggestions for new accessibility options, the majority of blind and visually impaired participants (76%) did not respond. This includes those who did not complete the questionnaire and those who skipped the question. We believe that they either had no suggestions or overlooked the question.

Of the valid responses, 8% of respondents chose the "I do not know" option, while the rest suggested the options listed below or wrote comments:

- Direct links to forms
- Proper page structure
- Websites must be edited according to the WCAG standard
- Linguistic search engine on the website

- Short description of hover images
- Complete deactivation of animation and advertisements
- Search fields should work everywhere
- "If the website has been created with accessibility in mind, no additional options are required. Every user has the tools they need. Otherwise, you would not be able to reach the website at all."
- "Blind users have very different needs and are the most vulnerable group when using the internet."

6   Discussion

In the general effort to maximise accessibility at all levels of life and activity, we often forget the more vulnerable or overlooked groups. One such group is blind and visually impaired people, who want to integrate into society like everyone else and are social beings who crave contact. Websites are one way of keeping in touch with them. Recognizing the importance of ensuring inclusion, the European Parliament has taken an important step by adopting a directive dealing specifically with the accessibility of websites and mobile applications for public institutions. The main aim is to facilitate access to public information for blind and visually impaired people, but in a broader sense it is also about contributing to their general integration into society.

In an effort to be more inclusive, various accessibility options have been introduced on selected public websites to improve usability for blind and visually impaired people. To fully understand the effectiveness of these options, we conducted a survey in which we asked the target group for feedback on their perceived usefulness. The results show that the option to change the text size is the one most frequently used by blind and visually impaired people.

This is closely followed by options that allow navigation using only the keyboard, and the electronic reading of selected texts with an eReader. Of particular note is the widespread use of text readers on mobile phones, with the Talkback application being the preferred choice on Android devices, while iOS devices offer a built-in option in the settings.

Despite these advances, there are still issues with using electronic text-to-speech options. Since the Slovenian language is not supported, users opt for Slovak because of its perceived similarity, mainly because it reads the letters -č, -š and -ž correctly. In addition, there are limitations in recognising content in .pdf documents and image recognition; notably, . jpg files remain a challenge. To solve these problems, not only technical limitations need to be addressed, but artificial intelligence solutions need to be explored to improve the overall efficiency of electronic text readers for blind and visually impaired people. The discrepancy between the accessibility options desired and those actually offered was also evident in the study of Hungarian public websites. Nevertheless, the results showed that an accessible website for people with special needs must include a font size of at least 12, the possibility of audible display of image content, correctly aligned text and a link to the same website displayed only once in the text content (Csontos & Heckl (2021). Accessible Technology (2022) from the University of Washington has provided an overview of current accessibility options and suggests the most important features of websites, including: working links, the ability to navigate the website using a keyboard, the organised structure or form of the website.

Accessibility options that are rarely used by blind and visually impaired people include the ability to highlight links, adjust the height of the bar, change the mouse pointer and highlight links. Options that are not used by blind and visually impaired people include the dyslexia-friendly option and the ability to interpret information in sign language, which is understandable and expected given the specifics of both disorders. Although these two accessibility options are not used by this group of people with special needs, there are other groups with special needs who benefit from these accessibility options and cannot be excluded from the range of options available on websites.

Surprisingly, however, it has been shown that the option to change the colour contrast is rarely used. This is a solution that we encounter all the time in everyday life. When we visit public facilities, city centres and schools, as well as kindergartens for children with special needs, we see different coloured floor markings, coloured markings on the stairs, colour-coded fences and other solutions that facilitate orientation. Given the rare use of options related to colour schemes and contrasts, the question arises as to what purpose is served by those colour markings on the

floor, glass surfaces, fence supports, etcetera? Based on our experience, we believe that possible answers to this question could be as follows:

The computer screen represents a much smaller area compared to public areas, and therefore the colour contrast in this case is not helpful for the orientation of blind and visually impaired people.

Perhaps the colours and contrasts are less suitable from the point of view of blind and visually impaired people, and stronger contrasts or pastel colours should be used. We are all constantly surrounded by a variety of content at every turn. This content only makes it more difficult for blind and visually impaired people to concentrate, which is particularly noticeable in the case of animation on websites, since the screen is smaller and animation is perceived even faster. The computer is an aid that is already crucial for blind and visually impaired people in everyday life, but it is not necessary for primary independence.

The results of the study coincide with the conclusions of the author Hrežo (2022), who points to the collaboration between people with special needs and web content developers. All with the aim of gaining a better insight into the necessary accessibility options for a particular website or websites. The author also emphasizes the importance of raising awareness of the issues that people with special needs face when it comes to digital accessibility.

7   Conclusion

The range of accessibility options is extensive, but not all options are equally useful or sensible from the point of view of blind and visually impaired people. This is because the accessibility of websites should be ensured not only for blind and visually impaired people, but also for people with other types of special needs and difficulties. This is particularly so for people with hearing impairments and people with specific motor impairments that make it difficult or even impossible to use haptic devices to interact with the computer.

The results of the study, together with the answers to the research questions, open up new research questions and opportunities for research. It would be useful to determine the contrasts and colours that are most helpful for blind and visually

impaired people and to define these as standard based on the results. The small sample size also shows the need to broaden the scope of the research and obtain more accurate information. Data collected based on a larger sample would show which accessibility options blind and visually impaired people use the most. This would encourage their improvement and development and the abandonment of options that are rarely used. At the same time, this would limit the choice of options and make it easier for people to decide.

References

Abuaddous, H., Jali, M. Z. & Basir, N. (2016). Web Accessibility Challenges. International Journal of Advanced Computer Science and Applications, 7(10), str. 1–10.

Accessibility of public sector websites and mobile apps. (27. 10. 2021). EUR- Lex. https://eur-lex.europa.eu/EN/legal-content/summary/accessibility-of-public- sector-websites-and-mobile-apps.html

Accessible Technology. (2022). University of Washington. https://www.washington.edu/accessibility/websites/

Afarid, M., Mohsenipoor, N., Parsaei, H., Amirmoezzi, Y., Ghofrani-Jahromi, M., Jafari , P., Sanie-Jahromi, F. (2022). Assessment of macular findings by OCT angiography in patients without clinical signs of diabetic retinopathy: radiomics features for early screening of diabetic retinopathy. BMC Ophthalmology, 22(281), str. 1–9.

Albreht, A., Zupanc, M., Pajk, D., Kutin, J., Gavran, K. & Černe, A. Z. (2016). Inkluzivno oblikovanje in dostop do informacij – v okviru načrtovanja in graditev objektov v javni rabi. Ministrstvo za okolje in prostor. https://www.gov.si/assets/ministrstva/MNVP/Dokumenti/Graditev/inkluzivno_oblikovanje.pdf

Central Vision Loss: Causes, Diagnosis, and Treatment Options. (20. 6. 2022). eSight: https://esighteyewear.com/central-vision-loss/

Common Eye Disorders and Diseases. (19. 12 2022). Centers for Disease Control and Prevention. https://www.cdc.gov/visionhealth/basics/ced/index.html

Csontos, B., & Heckl, I. (2021). Accessibility, usability, and security evaluation of Hungarian government websites. Universal Access in the Information Society, 20, str. 139–156.

Eye Diseases & Conditions. (n.d)). Prevent Blindness: https://preventblindness.org/eye-problems-adults-children/

Griff, A. M. (20. 1. 2020). What Causes Peripheral Vision Loss, or Tunnel Vision? Healthline. https://www.healthline.com/health/eye-health/peripheral-vision- loss

Hrežo, G. (2022). Website Accessibility Strategies (Order No. 28966566). Available from ProQuest Dissertations & Theses Global. (2631668294). https://www.proquest.com/dissertations-theses/website-accessibility-strategies/docview/2631668294/se-2

Introduction to Web Accessibility. (2023). Monsido. https://monsido.com/web-accessibility

Izguba vidnega polja: vzroki, zdravljenje in pomoč. (2023). Zelo zdravo. https://zelozdravo.com/izguba-vidnega-polja-povzroči-pomoč-pri-zdravljenju/

Kirkpatrick, A., O Connor, J., Campbell, A. & Cooper, M. (5. 6 2018). Web Content Accessibility Guidelines. W3C. https://www.w3.org/TR/WCAG21/

Kirkpatrick, A., O Connor, J., Campbell, A. & Cooper, M. (2023). Web Content Accessibility Guidelines (WCAG) 2.1. World Wide Web Consortium. https://www.w3.org/TR/WCAG21/

Konvencija o pravicah invalidov. (n.d.). Varuh človekovih pravic RS.
        https://www.gov.si/assets/ministrstva/MK/Zakonodaja-ki-ni-na-PISRS/Kulturna-
        raznolikost/1c24133420/Konvencija-o-pravicah-invalidov.pdf
Kumar, S., Divya Venkatesh, J. & Biswas, P. (2021). Comparing ten WCAG tools for accessibility
        evaluation of websites. Technology and Disability, 33(2), str. 1–23.
Lewthwaite, S., & James, A. (2020). Accessible at last?: what do new European digital accessibility
        laws mean for disabled people in the UK? Disability & Society, 35(8), str. 1360–1365.
Lorca, P., de Andrés, J. & B. Martínez, A. (2018). The Relationship Between Web Content and Web
        Accessibility at Universities: The Influence of Social and Cultural Factors. Social Science
        Computer Review, 36(3), str. 311–330.
Making the Web Accessible. (2022). Web Accessibility Initiative: https://www.w3.org/WAI/
Okvare vida. (2022). Zveza društev slepih in slabovidnih Slovenije. https://www.zveza-
        slepih.si/okvare-vida/
Radovan, M. & Perdih, M. (2016). Developing Guidelines for Evaluating the Adaptation of
        Accessible Web-Based Learning Materials. International Review of Research in Open and
        Distance Learning, 17(4), str. 166–181.
Refractive Errors. (10. 6. 2022). National Eye Institute. https://www.nei.nih.gov/learn-about-eye-
health/eye-conditions-and- diseases/refractive-errors

Educational Heritage in the Childhood of the Deaf and Hard of Hearing and its Influence on Participation in Adult Education

Jasmina Mirčeva,[1] Mirna Macur[2]
[1] Slovenian Institute for Adult Education, Ljubljana, Slovenia
jasmina.mirceva@acs.si
[2] Angela Boškin Faculty of Health Care, Jesenice, Slovenia
mmacur@fzab.si

The deaf and hard-of-hearing population in Slovenia has a lower level of education than other vulnerable groups and any measures in this area call for a comprehensive analysis. The purpose of the paper was to investigate the participation in formal education of deaf and hard-of-hearing adults and their experiences in childhood, which (negatively) influenced further education. The paper combines quantitative and qualitative methodologies. We sent an online survey to all the providers of adult primary and secondary education in order to learn about the participation of this population in education. This was followed by a focus group of experts and interviews with deaf and hard-of- hearing adults. Three categories of reasons for non-participation in adult education have been identified: negative experiences of previous schooling (difficulties in achieving educational goals and feeling unaccepted), low support from family and the wider environment, and objective reasons (inadequate knowledge to continue schooling). We conclude the paper with some suggestions.

University of Maribor Press

Izobraževalne izkušnje v otroštvu gluhih in naglušnih ter njihov vpliv na udeležbo v izobraževanju odraslih

Jasmina Mirčeva,[1] Mirna Macur[2]

[1] Andragoški center Republike Slovenije, Ljubljana, Slovenija
jasmina.mirceva@acs.si
[2] Fakulteta za zdravstvo Angele Boškin, Jesenice, Slovenija
mmacur@fzab.si

Gluhi in naglušni prebivalci v Sloveniji so nižje izobraženi od drugih ranljivih skupin, morebitni ukrepi na tem področju kličejo po celoviti analizi. Namen prispevka je bil raziskati udeležbo v formalnem izobraževanju odraslih gluhih in naglušnih ter njihove izkušnje v otroštvu, ki so (negativno) vplivale na nadaljnje izobraževanje. Prispevek je kombinacija kvantitativne in kvalitativne metodologije. Vsem ponudnikom osnovnošolskega in srednješolskega izobraževanja odraslih smo poslali spletno anketo, da bi spoznali udeležbo te populacije v izobraževanju. Spoznanja smo nadgradili s fokusno skupino strokovnjakov in intervjuji z gluhimi in naglušnimi odraslimi. Prepoznali smo tri kategorije razlogov neudeležbe v izobraževanju odraslih: negativne izkušnje poprejšnjega šolanja (težave pri doseganju izobraževalnih ciljev, občutek nesprejetosti), nizka podpora družine in širšega okolja in objektivni razlogi (neustrezno znanje za nadaljevanje šolanja). Prispevek zaključujemo z nekaterimi predlogi.

Univerzitetna založba
Univerze v Mariboru

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

707

1   Introduction

Education is a fundamental human right that enables the acquisition of knowledge and skills for a quality, successful and fulfilled life. According to the Constitution of the Republic of Slovenia (1991), education is free and the state creates opportunities for citizens to acquire an education. Individuals who did not acquire adequate education during childhood and youth can acquire it during adulthood. Adult education is defined in the UNESCO Declaration "Marrakech Framework for Action" as a human right that empowers the individual to become an active and global citizen (UNESCO, 2022a). The Declaration encourages all countries to set high goals for adult education in their national documents, as well as to support the participation of all residents, especially vulnerable groups, and thus to achieve the greater efficiency of systems, inclusiveness and justice. The fundamental message of UNESCO's Fifth Global Report on Adult Education and Learning (UNESCO, 2022b) is that it is necessary to reach those most in need of education throughout the world, especially those who achieve the lowest level of education. This message is very relevant for the deaf and hard-of-hearing population, as adults with reduced hearing have a lower level of formal education than the hearing population worldwide (Rydberg et al., 2009). Their knowledge and skills are also lower (OECD, 2016).

According to the World Health Organisation (WHO, 2023), 432 million people or 5% of the world's population have hearing problems. Of these, 34 million are children, and more than 400 million are adults. The WHO predicts that by 2050, there will be 900 million people living with hearing loss in the world. Therefore, the education of the deaf and hard of hearing is a challenge of the future and it is not just a statistical indicator, but an important political concept (Santos et al., 2020). In the Convention on the Rights of Persons with Disabilities (2008), disabled persons, including deaf and hard-of-hearing individuals, must be properly included in the general education system and must also be offered individual support. Slovenia, which is a legal and social state, pays special attention to ensuring the equal enjoyment of all the human rights and freedoms of disabled people (Constitution of the Republic of Slovenia, 1991). The fundamental goals of the country are: training for independent living, lifelong learning, quality living with appropriate support and maintaining the social inclusion of disabled people (ZSVI, 2018).

In the European area, there are different concepts and paradigms of education for deaf and hard-of-hearing residents, which are mostly classified into three categories: bilingual-bicultural education, auditory-oral and auditory-verbal education, and a combined approach.

According to the first concept, bilingual-bicultural education, deafness is a cultural rather than a medical issue (Rydberg et al., 2010). Knowing sign language at an early age should enable the deaf and hard of hearing to express themselves easily in a language they can use, which would contribute to their optimal cognitive and emotional development. According to the authors of this concept, deaf education should begin with learning sign language, followed by learning written and spoken language. Written and spoken language and sign language are equivalent. The authors highlight two separate realities: the reality of the deaf and the reality of the hearing. At the institutional level, the realisation of this concept is manifested in special schools or departments for individuals with hearing impairments, which can be found in Sweden, the USA and some other EU countries (Rydberg et al., 2010).

In contrast to this is the concept of auditory-oral and auditory-verbal education, where it is argued that deafness is a medical and not a cultural issue (Dammeyer and Stein, 2021). The education of the deaf and hard of hearing should come very close to the education of hearing individuals and encourage the use of spoken language. To facilitate understanding and communication with the wider environment, the deaf and hard of hearing should first learn to read the lips of the speaker. Speech training or oralism plays a particularly important role in the education of the deaf and hard of hearing. Oralism is seen as an alternative to the concept of bilingual education, and its advocates oppose the use of sign language in regular schools (Dammeyer and Stein, 2021).

An intermediate solution is the concept of combined education, where the use of means of communication that are the most appropriate in a given environment should be encouraged (Edwards, 2012). In education programmes where this approach prevails, lip-reading, the use of sign languages, gestures, fingerspelling and body language are encouraged. The aim of this approach is to optimise communication skills using combined means that are most suitable for each individual in a certain environment or period of life. It is a concept that is widely

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

709

used today in educational institutions in Norway, Denmark, France and Sweden (Edwards, 2012).

It is not known exactly what the educational level of deaf and hard-of-hearing residents in Slovenia is because there is a lack of statistical data that would give a picture of the situation. Experts state that this is at a much lower level compared to the hearing population (Juhart, 2023). Early school leaving is associated in the literature with lower writing skills, a higher risk of unemployment, lower opportunities on the labour market and increased marginalisation in society (Možina, 2000).

Formal education of deaf and hard of hearing children in Slovenia takes form of integration or inclusion (the inclusion of deaf and hard of hearing people in a regular form of education, which can be complete or partial) and segregation - participation in specially designed programmes for deaf people, which take place in special schools: The School for the Deaf and Hard of Hearing, Ljubljana; the Centre for Communication, Hearing and Speech, Portorož; and the Centre for Hearing and Speech, Maribor.

Deaf and hard-of-hearing adults can acquire knowledge and skills for obtaining a higher educational level together with hearing participants. They do not have the opportunity to participate in the segregated approach as these institutions only offer formal education to children and adolescents. Adults therefore acquire formal education either at adult education centres that offer primary and secondary education programmes, or at educational institutions that offer secondary education and have a department for adult participants.

Few sources examine how the educational experiences in the childhood of the deaf and hard of hearing influence their education in adulthood. The processes that take place in the school environment, at home or in society, which influence their education in adulthood, are rarely studied. Our assumption is that experiences during regular schooling significantly explain the decisions of deaf and hard-of-hearing adults on education.

The goals of this paper are to:

- present the level of participation of deaf and hard-of-hearing adults in primary and secondary education programmes;
- explore impact of the environment, experiences and events during regular schooling on the decision on education in adulthood;
- use results of this study to form suggestions for the empowerment of the deaf and hard-of-hearing in the context of education.

This paper is based on quantitative and qualitative research methods meaningfully complementing each other. Due to the relatively low education level of the deaf and hard of hearing, we first wanted to gain insight into the participation of the deaf and hard of hearing in adult education. The research question of the quantitative research therefore was: "To what extend do deaf and hard of hearing adults participate in primary and secondary education programs?" For this purpose, we created a detailed survey questionnaire and sent it to providers of adult education at the primary and secondary levels.

The aim of the qualitative research was to explore the impact of the environment, experiences and events during regular schooling on the decision to pursue education in adulthood. We divided it into several research questions:
1. How well was the school environment prepared for teaching deaf and hard-of-hearing children in the past?
2. To what extent was the family environment of the deaf and hard-of-hearing children favourable to education?
3. How does the education of the deaf and hard of hearing proceed in adulthood?

2 Method

2.1 Quantitative research

Participants

Quantitative research was conducted among providers of formal adult education programmes: both primary, offered by adult education centres (n=34) as well as secondary schools with a department for adult education (n=83).

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

711

Measures

Adult education providers were given short questionnaire to establish whether they had educated deaf or hard-of-hearing people in the last five years, how many there were, and how adult education centres are prepared to teach this vulnerable group, as well as what obstacles they encountered in doing so.

Data collection and data analysis

Adult education providers received online questionnaire via email to at least two addresses: to the manager and to the secretariat. If more than one answer was received from one institution, answers were integrated. Careful analysis of the data followed. No statistical analysis was needed due to the fact that not many deaf and hard of hearing participated in their adult education programmes.

2.2   Qualitative research

Participants

Table 1: Sample of the qualitative research

INTERVIEWS	FOCUS GROUP
I1 - a 74-year-old deaf man, profession: locksmith (3-year secondary vocational school)	FS1 - expert on deaf-blind people
I2 - a 42-year-old deaf man, education: Master of Economics	FS2 - expert from the Association of Teachers of the Deaf and Hard of Hearing
I3 - 43-year-old deaf man, profession: computer technician	FS3 - professional from the Association of Deaf and Hard of Hearing Societies
I4 - 69 years old deaf woman, retired	FS4 - interpreter
I5 - 45-year-old deaf woman, profession: confectioner (3-year secondary vocational school)	FS5 - interpreter
I6 - deaf man, profession: computer technician (4-year secondary school)	FS6 - representative of a company that prepares deaf and hard-of-hearing people for employment
I7 - deaf man, profession: graphic designer (4-year secondary school)	FS7 - representative of the Employment Agency

Results of quantitative analysis lead to in-depth analysis of the reasons for the non-participation of the deaf and hard of hearing in formal adult education. For this purpose, interviews with deaf people were conducted to learn their stories. In order

to facilitate an understanding of the educational experiences, life and work of the deaf and hard of hearing, we also held a focus group of key stakeholders in education that work with this vulnerable group (see Table 1).

Measures

All interviews were asked about their adult education needs and experiences. If none, their life story, especially their family (deaf or hearing family members) and educational history became important. In focus group different stakeholders were asked about reasons for nonparticipation of deaf and hard of hearing in adult education, their needs, obstacles, challenges. Also specific questions were asked in a focus group: members of employment office were asked about the employment process of deaf and hard of hearing; employees were asked about their experiences with deaf and hard of hearing employees and if they were sent to any kind of education or training; interpreters were asked to describe situations when they were needed by deaf people and if education process was one of them; education providers were asked about deaf and hard of hearing participants and providers' readiness to educate this particular group of participants.

Data collection and data analysis

Interviews took place in autumn 2022 with the help of translator since all of our interviewees were deaf. Afterwards, in October 18, 2022 focus group was conducted. All the interviews and focus group were recorded and transcribed; the material was then edited and coded (Kordeš and Smrdu, 2005). There was a separate analysis of the interviews and focus group conducted by the same steps: editing the transcripts, open coding, determining relevant themes and categories (Mesec, 1998); interpretation was integrated through three research questions.

3   Results

3.1   Participation of the Deaf and Hard of Hearing in Formal Education Programmes

Within the first objective of the paper the level of participation of deaf and hard-of-hearing adults in primary and secondary education programmes were examined.

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

713

There was 100% response rate from the adult education centres. Their answers showed that this group did not attend primary school education as adults[1] at all. Directors of adult education centres, education organisers, consultants and teachers gave their opinion on the reasons for non-participation.

The directors and organisers mainly focused on the systemic reasons for the non-participation in primary school education programmes. They pointed out the lack of additional help and resources, insufficient cooperation with associations for the deaf and hard of hearing, as well as with employers of these groups. They also pointed out the lack of teaching staff to work with the deaf.

Teachers who have worked with this vulnerable group agreed with explained systemic reasons of their superiors, but highlighted concrete proposals that would empower them to work with this group. They were self-critical, feeling that they were not well prepared to work with this vulnerable group, and they expressed a desire for additional training.

The analysis showed that there were no deaf or hard-of-hearing adult participants in secondary education offered by specialised schools for the deaf and hard of hearing in Ljubljana, Maribor or Portorož. There were 12 adult participants of secondary education programmes from this group in adult education centres and high schools with a department for adults (table 2).

Table 2: Deaf and hard of hearing adult participants in adult education centres and high schools with a department for adults.

High school programmes	Four-year professional education programmes	Three-year vocational education programmes	All participants
2	6	4	12

Despite the evidence (table 2) considerable educational activity that could increase the educational level of these adults is missing. Deaf and hard-of-hearing students participated more in programmes organised by high schools than in high school programmes at adult education centres.

---

[1] Due to the non-existent number of deaf and hard-of-hearing participants in the primary school education program, presentation in the form of graphs or tables was not possible.

3.2 The Influence of the Environment, Experiences and Events During Regular Schooling on the Decision to Pursue Education in Adulthood

Three key questions of the qualitative research focused our analysis: how well was the school environment adapted to deaf and hard-of-hearing pupils in the past; what kind of encouragement and support did they receive from the family and how is the education of the deaf and hard of hearing proceeding in adulthood?

Transcripts were edited and carefully analysed; open coding was implemented to get an overview of the gathered material (Table 3).

Table 3: Categories, themes and codes of interviews and focus group

Themes	Categories	Codes
School environment	School environment	regular/specialised schools: different standards; sign language not used (teachers, pupils); needs of deaf and hard-of-hearing pupils often not recognised
	Teachers	support, inflexibility and unresponsiveness
	School consultants	Lack of support
	Peers	Help from classmates, social exclusion
Family	Support	Reading books, additional explanation
	Lack of support	Fear of child's discrimination and social exclusion, guidance into easy study programmes (seamstress, locksmith)
Adult education	Formal	Non-existent, not motivated, lack of support, educational aspirations not met
	Nonformal	Mostly in NGOs for deaf and hard-of-hearing, some organised by employers

With the research question "How well was the school environment prepared for the teaching of deaf and hard of hearing children in the past?", we were interested in whether educational institutions took into account the specifics and needs of deaf and hard of hearing individuals and to what extent (if at all) they adapted the educational process. The experiences of today's adults differ depending on whether they attended primary school in specialised institutions or through integration.

Learning sign language today is a matter of the free decision of the individual, regardless of the degree of hearing impairment. Sign language made it easier for these children to communicate with each other, but studying in those institutions caused

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

715

problems in the outside world either for them when entering regular schooling or when getting a job. Education in institutions for the deaf and hard of hearing does not meet the same standards as regular primary schools, which makes difficult for students to continue their education*:*

> *And then my parents realised that this school was not suitable for me. The school programme was too easy. I practically didn't learn anything. I remembered what I heard at school. I automatically solved all the tests quickly. The teaching material lagged behind the material in the regular schools. (I6)*

Those who completed primary school at institutions adapted for the deaf and hard of hearing had great difficulties when entering a regular high school:

> *And in this elementary school, in the first semester when I joined the new school, it was a culture shock for me... (I6)*

> *I was among the deaf in primary school and there was an easy system. Then I went to secondary school, but it was a completely different system. I experienced a shock. I used to do the transcriptions, but high school was a more difficult system and there was no interpreter, etc.* (I5)

As a result, many could not complete more than a three-year vocational school.

Among the reasons for the difficult adaptation to the new conditions was the difference between sign language and the spoken and written word:

> *Because sign language is composed differently than the written word. Even the sentence structure is reversed, to put it in a native way. They also have sign language thinking. They dream in sign language. Sign language is the basis for them.* (FS5)

The next factor, which some have identified as an obstacle and others as an incentive, is the qualification of teachers. Well-trained and inspiring teachers can significantly support, encourage or motivate an individual in the educational process. The reverse is also true. If the teacher does not recognise and take into account the needs of the deaf and hard of hearing, it can make it very difficult for these students to go to school and can lead to severe traumatic experiences for them. However, to help the deaf, teachers and other professionals need specific skills. During the interviews, the hearing-impaired repeatedly reported negative experiences due to low qualifications, inflexibility in teaching and unresponsiveness. The following quote

draws attention to the extreme inflexibility of the Slovene teacher in assessing knowledge*:*

> *we also had dictation in the Slovene course. Everyone had to write it and the teacher evaluated how well you listened and how well you wrote. I mostly had blank paper.., because of that I had to repeat this course.* (I3)

The inflexibility of the implementation of the educational process was also shown when the teacher's position during the explanation, which enables lip-reading, was not taken into account. Hearing loops and other aids were not always available, so students were completely dependent on whether the lecturer was facing the class or not. We also identified situations where teachers were not aware of the disabilities of children in the class. That's why they were punished in the past, both with inadequate grades and physically:

> *In the second grade... the teacher beat me. Because she thought that I wasn't following the lesson because I wasn't paying attention, I wasn't listening to her explanation. Which was almost impossible because I couldn't even hear it. She didn't see it, she didn't understand it, and she was beating me to make me pay attention... that I wasn't dreaming or something.* (I3)

These experiences were undoubtedly unstimulating for every learner who experienced them. Learning a foreign language also posed a special problem for the deaf and hard of hearing:

> *I was not excused even for, say, a foreign language, English. In English, I not only had to write and read, but I also had to speak English. We deaf and hard of hearing people already have problems with pronunciation in Slovenian, let alone in English.* (I3)

Individuals with special needs, especially the deaf and hard of hearing, are disadvantaged in this area. This could result in finishing school very early. Others were more persistent and achieved their educational goals with support, though rarely felt any satisfaction when acquiring new knowledge and skills, more ambitious educational goals.

In addition to teachers, school counsellors have to be properly qualified to work with the deaf. Of course, their role is extremely important not only in organising learning assistance, but also in guiding, advising and monitoring individuals after completing their education.

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

717

> *Yes, I would* (note: continue her education). *But I had no one to show me the way. To move on. Then I slowly got used to being at work* (I4).

Most of our interviewers had no help in the school environment, no one empowered them to follow their educational and professional ambitions, they received no other advice. Regardless of which path they choose, the role of the counsellor in guiding the individual is precious.

Social contacts are also an integral part of schooling. The role of the peer group is important for every individual, especially for those with special needs who, due to their specifics, are less independent, more vulnerable and less integrated into the school environment. The role of peers can be valuable both in terms of assistance and in a social sense. Deaf and hard-of-hearing people cited positive and negative experiences in this respect.

The interviewees described feelings of loneliness in the school environment in the following way:

> *Yes, I wanted company, but no one could help me there. I know it is not my classmates' duty to help me. But I was alone. And I didn't have any help, even from the school or the counsellor. For example, someone asking me how I was doing, how I was feeling... there was nothing like that.* (I5)

Those who were successful in the education system emphasised the importance of the help of their classmates:

> *I mostly had to correct grades. Only after I got the first test did I remember what went wrong, what I didn't understand, and then I asked my classmate to explain it to me. We...studied together. (I3)*

Regarding the second research question: "To what extent was the family environment of the deaf and hard of hearing encouraging for education?" analysis showed that the success of children during regular education was highly dependent on the help and support of family members. Each of our interviewees has a different experience of acceptance in the home environment and help from parents and other family members. It is true, however, that deaf parents were not always able to help their children on their educational path, as they were marked by their own negative experiences from schooling and employment.

Deaf children from deaf families have no ambitions and no desire for education, even though they are highly intelligent and capable. Why are deaf parents pessimistic? Because of their experience and because they themselves did not receive the understanding and support needed to realise their ambitions. They are also aware that they will not be able to help the child... (FS2)

Deaf or hard-of-hearing children of hearing parents sometimes received exceptional support and help from parents who were aware that their children needed more help in the schooling process than other children.

The first week…, I couldn't follow the lessons. My parents wanted to provide me with knowledge and information in every possible way, so they bought a tape recorder. My mother then took notes from the lectures, regardless the extremely poor quality of the recordings due to noise. (I8)

However, not all experiences are positive: some felt that their parents were ashamed and hid their children's deafness - as a result, these children did not receive the necessary help and support during schooling, and they experienced trauma even before attending school.

The third research question was: "How does the education of the deaf and hard of hearing proceed in adulthood?" Most interviewed deaf people were not inclined to achieve higher education. Negative experiences certainly marked them or at least demotivated them when setting higher educational goals, as they expected less understanding of the educational material even in adulthood.

The analysis showed that there are also other reasons for the low level of participation in organised educational activities, in addition to the very negative experiences during regular schooling, for example, the lack of awareness of many actors in the environment (employers, professional workers in education, designers of educational programmes, or consultant workers). We also noticed a lack of advisory support, both in educational institutions and more widely in employment agencies, in companies where deaf and hard of hearing people are employed and in society in general.

Most of our interviewees had different professional and educational aspirations to those achieved: for example, I4 wanted to study geology and she arranged for an internship at the Geological Institute, but she was not accepted because of her

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

719

deafness. Then she started working as a seamstress. She wanted to further her education, but there was no one to advise her and show her the way.

> *Then I started a family, I had a child. There was no time in between. There was no chance. After several years of work, I didn't know where to go next.* (I4)

Another interviewee wanted to continue her education, but couldn't due to her hearing problems:

> *The knowledge I got was not enough for me and I lost my will and motivation because I had to rewrite a lot, I just watched and it wasn't for me.* (I5)

Retired deaf interviewees were not interested in furthering their education, but they believe in importance of education for young people today.

Our further inquiries revealed that some deaf and hard-of-hearing adults participate in non-formal education and training organised within deaf associations, cultural institutions or at the workplace.

> *I would also like to say that I also attended training courses for adults that are not of a professional nature. For example, cooking workshops and lectures within the framework of the Slovenian Society for Celiac Disease, round tables, conferences….* (I2)

During the interviews, we noticed a high level of participation in the lecture organised at the association's headquarters.

4   Discussion

In this paper, we focused on the education and experiences of the deaf and hard of hearing in childhood and their influence on the decision to pursue education in adulthood.

In the theoretical part, the dominant concepts of formal education for the deaf and hard of hearing people in the European countries were presented: bilingual-bicultural education, auditory-oral and auditory-verbal education and concept of combined education. These concepts have their advantages and disadvantages. Rydberg et all. (2010) emphasises that knowing sing language enables deaf people to

express easily, however this group will find it more difficult to integrate into a world that is not adapted to their needs and specifics during adulthood. According to Dammeyer and Stein (2021) auditiory-oral and auditory verbal education is very close to education of hearing people, however rarely fully realised in learning environments that are not primarily intended for the deaf. Edwards (2012) advocates the combination of communication skills most suitable in certain environment, but is aware that the combined education relaying on different approaches reduces the quality of both languages.

Research has shown that there is no single, definitive concept that would be most appropriate in European countries. State systems have their own characteristics, traditions and experiences in this area, and this diversity is positive because it takes into account the specificities of the environment and the groups. However, diversity is not unique to Slovenia. In Slovenia, there is one predominant model of formal adult education (most similar to auditiory-oral and auditory verbal education) and there is no possibility for greater integration of deaf and hard-of-hearing people with regard to formal education.

Analysis of the data to the first research question showed that deaf adults do not participate in primary school education programme at all. Some of them have been identified in secondary education programmes, but not enough to meet the needs of this group to obtain a higher level of education. In this article, some systemic, institutional or individual reasons for the lack of educational participation have been mentioned, but the focus of the study were the reasons that show how experiences from childhood influence education in adulthood.

We explored reasons for low educational participation of this particular group with interviews with deaf adults and focus group with other relevant stakeholders. Their experiences in early childhood undoubtedly influenced their educational preferences even in adulthood: the educational environment during regular schooling; specific experiences with peers during regular schooling; experience of education in special institutions; and family environment.

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

721

Deaf and hard of hearing adults who were educated in specialised institutions had fewer problems with acceptance in the environment than students in integration, but had much greater problems when finishing school. It was more difficult for them to adapt to the educational, working and wider social environment.

In the qualitative research some positive experiences in the implementation of the educational process, evaluation, counselling and support have been identified. For some deaf adults, the period of childhood was an opportunity to learn different skills, get to know a specific reality and prepare for later implementation in social life, work, and society in general. Positive, and sometimes also some negative experiences, enable even greater engagement of the individual, whose achievements at work or in the field of education were also highlighted in the article.

The consequences of educational failure lead to the suggestions that create conditions for lifelong learning for this group.

a) When planning and implementing programmes for deaf and hard-of-hearing adults, it is necessary to take into account their needs, interests, specifics and previous experience. This requires exceptional awareness, sensitivity and flexibility on the part of programme designers, teachers and other professionals. Kavkler (2010) pointed out that it is a particular problem that adults who re-enter formal forms of education find it difficult to make up for educational deficits from their youth education and that adults who did not gain positive educational experiences in their youth are rarely motivated for education in adulthood.

b) When conducting the training, it is necessary to provide learning assistance to all deaf and hard-of-hearing participants in accordance with the individual educational plan. It is also important to define a support network consisting of programmes and activities: additional attention should be paid to their educational needs, not only from the point of view of learning support, but also from the point of view of helping them overcome obstacles arising from social disadvantage.

c) It is necessary to offer various forms of professional training to teachers and other professionals of hard of hearing adults. It would be useful to influence a change in learning methods and approaches for adults with low educational achievements (greater individualisation, an appropriate choice of topics etc.).

d) All participants need to be provided with information and counselling for planning education and career development before, during and after completing the primary or secondary education programme (Vilič Klenovšek, 2023). For high-quality and successful achievement and counselling, an adult education consultant must be properly qualified, so appropriate further training programmes for consultants should be developed for more effective outreach and the inclusion of these groups of adults.

5   Conclusion

The problem of the educational failure of deaf and hard-of-hearing adults is not only an individual problem, but a complex social problem that requires a systematic and in-depth search for an effective solution strategy. Our research identified three categories of reasons for non-participation in adult education: negative experiences of previous schooling (difficulties in achieving educational goals and feeling unaccepted), low support from family and the wider environment, and objective reasons.

The problem of educational failure has been insufficiently studied. Needs and problems of adult deaf and hard-of-hearing are less known than those of younger generation so more studies of the same kind are needed.

Limitation of our study is the focus on participation in formal education programmes, especially primary and secondary education, although we are aware that higher levels of education are also important for the analysed population. We also mentioned the participation of the group in non-formal education and learning activities, as this has an extremely important social role as well as an educational one. Further study of the role of non-formal education and training for the deaf and hard-of-hearing population would be an important research challenge and can be a suggestion for further studies.

The research revealed lack of evidence on deaf and hard-of hearing adult population. The provision of statistical data would allow for more in-depth studies and insights into the education features of this population, which is clearly disadvantaged in terms of education.

J. Mirčeva, M. Macur: Educational Heritage in the Childhood of the Deaf and Hard of Hearing and it's Influence on Participation in Adult Education

723

References

Constitution of the Republic of Slovenija. (1991). *Uradni list RS*, št. 33/91-I, 42/97 – UZS68, 66/00 – UZ80, 24/03 – UZ3a, 47, 68, 69/04 – UZ14, 69/04 – UZ43, 69/04 – UZ50, 68/06 – UZ121,140,143, 47/13 – UZ148, 47/13 – UZ90,97,99, 75/16 – UZ70a in 92/21 – UZ62a. http://pisrs.si/Pis.web/pregledPredpisa?id=USTA1

Dammeyer, J., and Stein, E.O. (2021). Changes in educational planning for deaf and hard of hearing children in Scandinavia over the last three decades. *Scandinavian Journal of Disability Research*, 23(1), 114-123.

Edwards, R. A. R. (2012). *Words Made Flesh: Nineteenth-Century Deaf Education and the Growth of Deaf Culture*. New York University Press.

Janhar Černivec, V. (2022). *Norveška: Izobraževalni sistem za gluhe [Norway: Education system for the deaf]*. Material developed in the project Trap up (Transnational Professional Upgrading Project). Slovenian institute for adult education.

Juhart, M. (4.6.2021). Velik dosežek za slovenski znakovni jezik: 62. a člen ustave. *[A great achievement for Slovenian sign language: Article 62 of the Constitution]. Delo*. https://www.delo.si/novice/slovenija/velik-dosezek-za-slovenski-znakovni-jezik-62-a-clen-ustave/

Kavkler, M. (2010). Izobraževalna uspešnost učencev s specifičnimi učnimi težavami – izziv za pedagoško stroko. In, *Specifične učne težave v vseh obdobjih: Tretja mednarodna konferenca o specifičnih učnih težavah v Sloveniji in Nacionalna konferenca Tempus* (pp. 117-128). Društvo Bravo.

Kordeš, U., and Smrdu, M. (2015). *Osnove kvalitativnega raziskovanja*. Založba Univerze na Primorskem.

Mesec, B. (1998). *Uvod v kvalitatinvo raziskovanje v socialnem delu*. Visoka šola za socialno delo.

Možina, E. (ed.). (2012). *Evalvacija Osnovne šole za odrasle: Poročilo o rezultatih Evalvacije programa*. Slovenian institute for adult education. https://arhiv.acs.si/porocila/Evalvacija_Osnovne_sole_za_odrasle.pdf

Možina, E. (2000). Pismenost odraslih v Sloveniji – pozabljeni kapital. In M. Velikonja (ed.), *Pismenost, participacija in družba znanja* (pp. 18-41), Slovenin institute for adult education.

OECD. (2019). *Skills Matter: Additional Results from the Survey of Adult Skills*. https://doi.org/10.1787/1f029d8f-en.

Rydberg, E., Gellerstedt, L.C., and Danermark, B. (2009). Toward an equal level of educational attainment between deaf and hearing people in Sweden? *J Deaf Stud Deaf Educ*, 14(3), 312-323. doi: 10.1093/deafed/enp001.

Rydberg, E., Gellerstedt, L.C., and Danermark, B. (2010). The position of the deaf in the Swedish labor market. *Am Ann Deaf*, 155(1), 68-77. doi: 10.1353/aad.0.0130.

Santos, S., Cosmin, N., and Macedo, E. (2020). What do young adults' educational experiences tell us about Early School Leaving processes? *European Educational Research Journal*, 19(5), 463–48. https://doi.org/10.1177/14749041209468

UNESCOa. (15.6.2022). *CONFINTEA VII: Marrakech framework for action*. https://unesdoc.unesco.org/ark:/48223/pf0000382306

UNESCOb. (15.6.2022). *Global report on adult learning and education*. https://www.uil.unesco.org/en/adult-education/global-report-grale

Varuh Človekovih pravic (2008). *Konvencija o pravicah invalidov. [Convention on the Rights of Persons with Disabilities]*. https://www.varuh-rs.si/pravni-temelji-cp/ozn-organizacija-zdruzenih-narodov/konvencija-o-pravicah-invalidov/

Vilič Klenovšek, T. (2023). Vloga svetovalne dejavnosti v izobraževanju odraslih za pravičnejšo udeležbo odraslih v vseživljenjskem učenju. In J. Mirčeva (ed.), *Udeležba odraslih v vseživljenjskem učenju: stanje, značilnosti in razlogi*. Slovenian institute for adult education.

World Health Organisation WHO (15.12.2023). *Deafness and hearingloss*. https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss

Zakon o socialnem vključevanju invalidov (ZSVI). [Act on Social Inclusion of Disabled Persons]. (2018). *Uradni list RS,* št. 30/18, 196/21. http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO7808

Zakon o uporabi slovenskega znakovnega jezika (ZUSZJ). [Act on the Use of Slovenian Sign Language]. (2002). *Uradni list RS,* št. 96/02. http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO1713
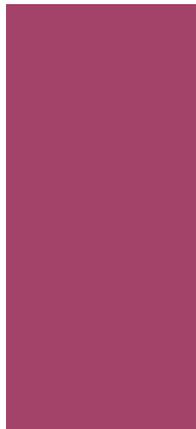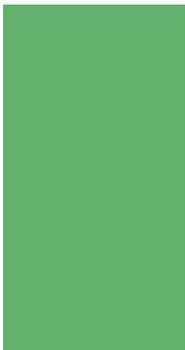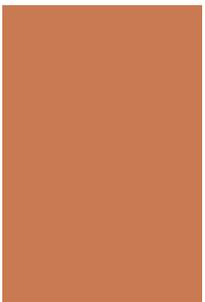
Interdisciplinary Research in Teaching and Learning: New Perspectives and Approaches

Miha Marinšek, Maja Hmelak (eds.)
University of Maribor, Faculty of Education, Maribor, Slovenia
miha.marinsek@um.si, maja.hmelak@um.si

The monograph titled "Interdisciplinary Research in Teaching and Learning: New Perspectives and Approaches," brings together 37 original scientific articles that explore the multifaceted dimensions of education. The contributions span a wide range of topics including innovative teaching methodologies, the integration of technology in learning, competency development, and educational psychology. Each article provides a unique perspective on how interdisciplinary approaches can enhance educational practices and outcomes. The collection aims to bridge theoretical insights with practical applications, offering valuable information for educators, policymakers, and researchers. By addressing contemporary challenges and proposing solutions, this monograph serves as a comprehensive resource for those seeking to understand and improve the complex landscape of modern education. The diverse viewpoints and rigorous research presented herein underscore the importance of collaborative efforts in advancing teaching and learning across various educational contexts.

University of Maribor Press

INTERDISCIPLINARNE RAZISKAVE V POUČEVANJU IN UČENJU

MIHA MARINŠEK, MAJA HMELAK (UR.)
Univerza v Mariboru, Pedagoška fakulteta, Maribor, Slovenija
miha.marinsek@um.si, maja.hmelak@um.si

Monografija z naslovom "Interdisciplinarne raziskave v poučevanju in učenju: novi pogledi in pristopi" združuje 35 izvirnih znanstvenih člankov, ki raziskujejo večdimenzionalne vidike izobraževanja. Prispevki pokrivajo širok spekter tem, vključno z inovativnimi metodologijami poučevanja, vključevanjem tehnologije v učenje, razvojem kompetenc in pedagoško psihologijo. Vsak članek ponuja edinstven pogled na to, kako lahko interdisciplinarni pristopi izboljšajo izobraževalne prakse in rezultate. Monografija si prizadeva povezati teoretična spoznanja s praktično uporabnostjo, kar ponuja dragocene informacije za učitelje, oblikovalce politik in raziskovalce. Z obravnavo sodobnih izzivov in predlaganimi rešitvami ta monografija služi kot obsežen vir za tiste, ki želijo razumeti in izboljšati kompleksno področje sodobnega izobraževanja. Raznolika stališča in temeljite raziskave, predstavljene tukaj, poudarjajo pomen prizadevanj za napredek v poučevanju in učenju v različnih izobraževalnih kontekstih.