



The Raising Digital Competence project presents itself

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Editor: Amela Sambolić Beganović, National Education Institute Slovenia

Authors: Nives Kreuh, PhD, University of Applied Sciences Utrecht, Igor Pesek, PhD, Ministry of Education, Romana Košutnik, Andreja Čuk, MSc, Amela Sambolić Beganović, Tomi Deutsch, PhD, Petra Dermota, Dušan Klemenčič, Lidija Jerše, Anita Poberžnik, Mojca Dolinar, National Education Institute Slovenia, Ingrid Možina-Podbršček, Arnes

Review: Amela Sambolić Beganović, National Education Institute Slovenia

Translation: Roman Šimec

Language review: Ensitra prevajanje, Brigita Vogrinec Škraba, s. p.

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Special thanks

The central role in carrying out the Raising Digital Competence project was played by the staff of the National Education Institute Slovenia and its consortium partner Arnes.

The Centre for Raising Digital Competence (Središče za dvig digitalne kompetentnosti) is composed of 21 experts in the field of education: employees of both consortium partners, including school educational and management staff, members of development teams as well as experts from various faculties and public institutions participating in the project, participated in directing and coordinating the programme partners, programme activities, educational institutions and other stakeholders.

Regional consultants and members of development teams were actively engaged in the development and implementation of various training programmes for educational and management staff of Slovenian kindergartens, primary schools and secondary schools, secondary school residence halls music schools and institutions for education of children with special needs.

During the implementation of project activities, an important role was played by members of development teams included in the Raising Digital Competence project – teacher practitioners who supported their colleagues in the development of their digital competence.

The staff of the Faculty of Natural Sciences and Mathematics developed and began implementing the verified study programme: Education of ICT coordinators.

Educational experts at the National Education Institute, Slovenia and the project facilitator at the Ministry of Education managed the overall execution of the project and communication with the participating educational institutions.

Without the engagement of all the parties mentioned above, the goals of the project which was planned to be undertaken within a three-year period could not have been accomplished. We appreciate enormously the engagement and support of those involved in our common effort to raise digital competences of educational staff in educational institutions.

Introduction

The handbook in front of you is the first of the three handbooks covering the activities carried out within the project Raising Digital Competence conducted by the National Education Institute Slovenia and its consortium partner Arnes in the years 2022 and 2023. The collection of handbooks attempts to address the challenges of time marked by new phenomena in digital environment that interlace all layers of the society and inevitably have a profound effect on the school environment.

In the first part of this handbook, which is the first in the series of handbooks in the DDK project, we present the path of digital transformation of school teams and individual members of school educational and management staff as envisioned in the project Raising Digital Competence. In the second part, we present expert background for the development of digital didactics and we highlight considerations regarding the further development of this field. We conclude the second part of the handbook with a vision of development of digital competence of professional staff¹ and learners. In the third part of the handbook, we present the summary of the second and third handbooks, which are published in full in Slovenian.

The second handbook offers recommendations to developers of digital strategies, provides answers to the questions as to which elements and areas are of crucial importance for digital transformation of schools, and points to the ways in which wider interest of everybody involved in the education process could be taken into account during the development of the digital strategy.

In the third handbook, which includes recommendations for guiding and supporting learners² in acquiring their digital competences, we present concrete examples of planning and performing the activities to support learners in acquiring digital competences.

This handbook also includes two annexes/posters. They visually represent the elements of digital strategy (DS) and the use of digital technology in a learning process, summarising the key focuses for both areas in a single place. In addition to content knowledge, educational and management staff of educational institutions require a variety of other types of knowledge, among which we point out didactical knowledge and knowledge of the use of didactical technologies in order to efficiently plan and carry out the educational process. These types of knowledge represent the foundation of digital didactics. It is important that teachers as individuals critically assess their knowledge, but it is equally important that entire school teams assess the level of their digital competence and digital competence of learners. This is the only way in which individuals and teams can plan the path of their digital transformation. Several self-assessment tools are available to assess the level of digital competence of individuals and teams, while a variety of suitable trainings is available for acquisition of new knowledge.

In the present handbook we will summarise the path to systematic development of digital didactics practiced by school teams and individual staff members, as foreseen in the project Raising Digital Competence: self-assessment of educational institutions and individual staff members, well-thought-out planning of digital strategies for educational institutions as well as seminars and other forms of training to raise digital competences. A very important aspect of professional development of entire teams that was given a special attention in the project is mutual learning within teams where staff members support each other in professional development, learn from each other and exchange experience and examples of good practice. Here, ICT coordinators play a special role, supporting colleagues within the team in acquiring new knowledge in the field of digital didactics.

1. The term professional staff in this handbook includes educators, teachers as well as management and other professional staff of educational institutions
2. In the context of this handbook, the term learners is meant to include children, pupils, adults and everybody engaged in the process of learning.

A foreword to accompany the collection of handbooks

Vinko Logaj, PhD, Director of the National Education Institute Slovenia

Over the last fifty years, the dynamics of technical and technological changes that have had a decisive effect on work in kindergartens and schools has been its most intensive in the last decade. In the school practice, we are facing new challenges and guiding principles that are often considered an integral part of the “21st century school.” It is no longer a question of whether digital technologies and everything associated with them belong in schools, but rather how to use everything available in the field of digitalisation and digital resources as efficiently and effectively as possible.

The development of didactics as well as new knowledge and skills of headmasters/headmistresses, educators, teachers and other educational staff are certainly among the greatest challenges in the field of education. We associate this with the so-called transformation of kindergartens, schools and school teams.

At the National Education Institute Slovenia, we believe and understand that “transformation” is a process we launched successfully together with kindergartens, schools and project partners through a variety of activities, and particularly through implementing the Raising Digital Competence project. Experience shows us that every process needs to be supported, even after the conclusion of projects and that activities that proved to be relevant in the course of projects need to be implemented in the wider school environment. We also intend to do this with the Raising Digital Competence project, which is soon to come to an end.

In the area of using digital technologies and digital strategies sensibly, a sufficiently high level of professional competence is essential. Within the project we therefore developed seminars at the National Education Institute Slovenia that support every professional staff member in exploring and upgrading their own digital competences. Here, we see the opportunity for a sustainable approach to building digital competence that individuals can achieve more successfully through their own reflection and self-regulation in learning.

Perhaps someone might ask the question as to why the National Education Institute Slovenia is printing a handbook for headmasters/headmistresses and professional staff within the project entitled Raising Digital Competence. We estimate that even in the digital age, physical records last longer. At the same time, we are aware of what was said by one of the authors in this handbook: “A page as a format has always ruled us, without us actually being aware of it. A screen or a laptop opens like a book, it emulates a page and we write on it, if only with our fingers on a smartphone. Also, all educational institutions and classrooms or lecture rooms are built in accordance with the page principle.” We consider it important that activities and achievements within the project, as well as certain theoretical highlights that speak in favour of the development of digital didactics and the improvement of digital competences of educators, are recorded in digital as well as in paper form.

We want to see the publications of the National Education Institute Slovenia reach every professional staff member in schools and kindergartens and that searching for answers to the challenges of education will also continue in the future, together with the representatives of kindergartens and schools, consultants from the National Education Institute Slovenia and its partners. I would like to express my gratitude to everyone participating in the project for the truly amazing work that has been accomplished. I wish you a pleasant reading experience, be it on paper or screen.

Marko Bonač, Director of Arnes

Over the past thirty years, relentless development of information-communication technologies marked and thoroughly transformed education as well as our lives. Throughout this process, Arnes has supported schools.

On this common path, we became well acquainted with many weaknesses in our knowledge and understanding of digital aspects of education that became painfully apparent during the recent pandemic, and which we learnt how to address with a joint effort. At Arnes, we have internalised the belief that “learning to fish” must come in the same package as the fishing gear. This is why we have put a lot of effort into this learning, while relying significantly on collaboration with “learners” and on good practice.

As a partner, we brought this knowledge and the lessons learnt to the Raising Digital Competence project in which, together with the National Education Institute, Slovenia, we built the framework of digital strategies and training intended to raise digital competence. Based on the results of the analysis of required knowledge that was conducted by schools using the Selfie tool, two important areas that have long been strongly supported by Arnes, i.e. digital identities and online security, were included in the essential contents that need to be covered. A special course which was developed within the project is intended for teachers without experience in the use of ICT in schools. It is mainly focused on the topics related to user accounts, safe internet use and copyrights.

It is also self-evident that Arnes provided assistance wherever the implementation of the project relied on digital technologies: the project’s website, portal and SIO communities, online classrooms, user support and last, but not least, technical and multimedia support provided for the great concluding conference.

The modern notion of ‘digital’ is somewhat blurred by the message that information-communication technologies are mostly about understanding information and communication. The main lesson learnt during the course of the Raising Digital Competence project is that boosting our digital confidence is what we essentially need to reliably work our way through in the digital century. In this way, technology will be our friend where it helps us discover new dimensions of learning and teaching, while not becoming an unwelcome companion when we don’t need it. Arnes will, as usual, continue to provide assistance to schools in this respect.



PART ONE

Andreja Čuk, MSc, and Romana Košutnik,
National Education Institute Slovenia,
Ingrid Možina-Podbršček, Arnes

1. About the Raising Digital Competence project

The Raising Digital Competence project (hereinafter: DDK project) was planned as a 3-year development project to be implemented from 1 May 2021 to 31 August 2023. However, due to a turn of events, the duration of its implementation was reduced to a little over a year, while the indicators and set goals remained unchanged.

At the end of June 2021, the managing consortium partner, National Education Institute Slovenia, together with the consortium partner Arnes, put out an invitation to participate, thus inviting educational institutions and within them the educational institution staff: headmasters, teachers and other professional staff in the fields of pre-school education, primary school education, primary music education, vocational and technical education, general secondary education, education of children and young people with special needs and education in secondary school residence halls.

220 educational institutions or their organisational units responded to the invitation (after the initiation of the project, three educational institutions withdrew from the project) along with 9,940 staff members who carried out the activities specified in the invitation. Educational institution staff members who decided not to participate in the project were nonetheless invited to participate in the training programmes undertaken by both consortium partners together with other project partners.

Project activities officially began on 1 January 2022, while we first met with headmasters and leaders of school development teams of the selected educational institutions at the introductory meeting in late March 2022.

Project activities were directed towards increasing the quality and efficiency of staff training by encouraging the development of digital strategies that contribute to, and enable, the development of innovative learning environments. The goal set by project collaborators was to contribute to raising digital competences of educational institution management and educational staff and through them the development of digital competences of children and pupils (hereinafter: learners).

Innovative learning environments are environments which include the use of emerging technologies, approaches and methods to improve the learning process. Such environments stimulate interaction, collaboration and active engagement of learners and enable adaptability and adaptation to individual needs of learners, consequently contributing to improved quality of education.

To this purpose, we developed a variety of training courses within the project, including different forms of learning (individual learning, learning in pairs or groups, remote and live learning etc) intended to guide management and educational staff of educational institutions towards reflective practice, planning and professional development of entire teams, as well as individuals, with the help of carefully considered and sensible use of digital technologies.

Management and educational staff, and particularly, members of school project teams were guided and stimulated to strive for planned professional development of entire teams and for the establishment of a learning community in every educational institution. Concern for lifelong learning and continuous professional development have an important effect on quality assurance in educational institutions. If members of the teaching staff in a learning community learn from one another with a goal that was recognised as important by all members, then it is an efficient way of pursuing high-quality professional development which includes knowledge of one's own professional area as well as the development of key competences for lifelong learning; digital competences in our instance. At the workshops organised for their colleagues by members of school development teams, reflective practices in the field of digital competences, which they incorporated in their own respective professional fields, were jointly developed and implemented by teachers, educators, headmasters and other staff members. Within the

activities that were implemented, they developed the area of digital didactics, which uses the potentials of digital technologies in teaching and learning in order to provide a higher quality of education and prepare learners for the modern digital era.

The development of a learning community includes activities that ensure sustainable approach to develop digital competence of school management staff as well as of learners.

Internationally, as well as in Slovenia, many studies (e.g. experience from the Nova kultura ocenjevanja (New culture of grading), Eufolio, ATS and Innovative pedagogy 1 : 1 projects) have shown that associating in professional learning communities depends on the level of education provided by schools: as a rule, secondary schools are less inclusive, while more activity is taking place at the level of professional associations.

The results of TALIS 2018 also confirm that collaboration among teachers strongly depends on the level of education provided: in the most common form of cooperation, i.e. discussions about learning of individual learners, the OECD average is 61%; in Slovenia, the average in primary schools is 70% and in secondary schools it is only 52%.

Many informal learning communities of teachers and headmasters were established in schools during the time of crisis teaching over the past two years, but they did not include all the educational institution staff members; in most cases, those with the least developed digital competences were excluded.

According to Hattie³, in terms of the scale of effect on students' learning outcomes, teacher credibility together with providing a formative assessment is ranked 4th with an effect figure of 0.40, while at the same time (p. 35), he emphasises a strong link between the improvement of students' learning outcomes and permanent focus of all the school staff involved who are aware that differences between teachers exist and who are devoted to the development of professional knowledge in order to achieve positive effects on the outcomes of all students.

A digital strategy⁴ must include the interests of everyone involved in the education process, therefore it is advisable that it is developed by an appropriate team that includes other staff members as required. It is important for an educational institution's digital strategy to be as comprehensive as possible and to include all of the key areas: training planning, developing digital didactics in educational institutions and equipping educational institutions with digital technologies. By including training programmes for the permanent development of educational staff in their digital strategies, educational institutions acted as learning communities and ensured professional development of individuals as well as their development as whole entities. As a result, educational institutions increased their autonomy in selection and in the implementation of training, they developed the established models of development of their own learning communities, because they already developed such models at the time of distance learning during various projects (e.g. ATS STEM), while the DDK project provided regional consultants who consulted them as required in developing comprehensive digital strategy plans, training plans and in monitoring the implementation of training (self-reflection using the Selfie tool, the analysis of the situation on the basis of results, identification of development priorities and development of the digital strategy implementation plan⁵). With a well-planned digital strategy, the foundation is laid for each educational institution to be able to ensure the quality of teaching and learning as well as the systematic development of digital competences for the staff and learners.

One of important project activities is the development and implementation of education modules for ICT coordinators at educational institutions (from kindergartens to secondary schools). Based on the accredited programme of the the Faculty of Natural Sciences and Mathematics, University of Maribor, education of ICT coordinators at educational institutions began in May 2023. Both consortium partners were involved in implementing individual modules. During their study, the trained ICT coordinators acquire necessary processing knowledge and digital competences and they also develop a vision;

3. Hattie, *Visible Learning for Teachers*, 2018, p. 326

4. More on digital strategy planning is available in the handbook, *Zakaj digitalna strategija? (Why Digital Strategy?)*

5. More on drawing up a digital strategy's implementation plan is available in the handbook, *Zakaj digitalna strategija? (Why Digital Strategy?)*

while recognising the importance of technology in the learning process, they become familiarised with working methods and various didactical approaches. Inspirational teachers were invited to enrol whose desire and knowledge could lead their educational institutions on the digital transformation journey. Enrolment in the study programme was open to educational staff fulfilling the conditions for teaching at primary and secondary schools. The trained ICT coordinators will play a crucial role in digital transformation in educational institutions. As experts in the field of digital education, they will support and guide their colleagues in the development of digital didactics.



Figure 1:

From self-assessment to digital strategy: development-related work with school project teams



Source: <https://education.ec.europa.eu/sl/selfie>

One of the first project activities was to train school coordinators to carry out self-assessments of learning efficiency by promoting the use of digital technologies using the Selfie tool. Schools registered to use the Selfie tool which is designed to assist them by including digital technologies in the processes of teaching, learning and knowledge assessment. The Selfie tool carries out a comprehensive assessment of various aspects of the use of technologies in schools by including the entire school community: school leadership, teachers and learners. On the basis of the answers provided, the tool creates a report on a school's strengths and weaknesses in the use of digital technologies. As every school is unique, the tool is adaptable. A school can choose and add questions and statements to match its needs. After the self-assessment is completed, the tool generates an interactive report that includes an in-depth data analysis and brief insight into the school's strengths and weaknesses. The report enabled schools to improve their understanding of the use of digital technologies in order to support teaching and learning in their own school practice, to analyse the situation and to reflect on the use of digital technologies for three target groups (leadership, teachers and learners) and levels of education.

Once the self-assessment was completed, when educational institutions received reports on the level of their digital competence, we organised training for members of the school project teams. The purpose of the training was to implement a digital strategy planning, which took place at various organisational units of the National Education Institute, Slovenia. Prior to training, school project teams prepared reports on the completed Selfie assessments. They completed an online questionnaire about expectations, goals and the purpose of their participation in the project which was intended to raise digital competence, about their use of online learning environments and about their experience gained while using technologies in the pedagogical process. On this basis, entire school teams conducted an analysis of the situation, which is one of the obligatory steps in developing a digital strategy. In the months that followed, the schools were provided with expert support from regional consultants – experienced

teachers and headmasters who already had experience with digital strategy planning and who have already identified, expounded and covered the areas of digital didactics at their educational institutions. The support of experienced colleagues who were more familiar with the specifics of schools at regional level proved to be invaluable. They offered support in solving dilemmas, finding solutions in the face of greater and lesser challenges and provided practical advice and tested solutions.

Assisted by regional educational institution consultant, school teams prepared for digital transformation and the establishment of learning communities within educational institutions. Together with colleagues in their school teams, they discussed the necessary changes and after analysing the self-assessment reports (Selfies) they pointed out the possibilities, strengths and weaknesses, pitfalls and opportunities, technical capabilities and needs as well as the use of their own resources in respect of expertise and skills. They engaged in a reflection on the training required, exchange of good practice examples, technical and didactical support (an important role of ICT coordinators), class organisation, and communication at the level of all the participating stakeholders. They supplemented strategic educational institution documents, thus complementing the common vision of each educational institution with an implementation plan that included digital strategies. In this way, they responded to the needs of the educational staff and learners. Implementation of digital strategies and quantifiable effects were monitored regularly by school development teams.

Collaboration with schools within the Raising Digital Competence project was undertaken at different levels. Initially it began as a presentation of the project, looking at its advantages, requirements and expectations. Although the meeting was held on 6 July 2022, participation was excellent, which was the first indicator to show that schools were really interested in the project.

Further on, my role in the project changed to that of consultant who advised each school individually in drawing up its digitalisation plan. The schools were at very different levels of digitalisation, with different digital staff competence and with different equipment, therefore an individual approach was the only way to ensure results. The schools' approach to the project was very constructive, focusing on finding optimal solutions for each individual school. The plans were prepared by schools with a view to ensure their feasibility and to obtain quantifiable results. In addition, I advised the schools to prepare their plans in such a way that their continuation would be possible after the conclusion of the project.

We constantly pursued the goal of introducing more flexible forms of learning through the efficient use of digital technologies and by encouraging all educational staff members to plan and pursue their own digital professional development

Simon Dražič, regional consultant

Based on the report findings on the completed self-assessment (Selfie), the answers to questions they asked in the online questionnaire and after the completed training, each of the schools identified its development priorities for the current school year, defining their implementation through a digital strategy for the school.

It was recommended to schools included in the DDK project that their digital strategy becomes part of their educational institution annual work plan. While planning their digital transformation, educational institutions assessed the baseline situation in the field of digital competence (analysis of the situation), they identified one or two development priorities, they drew up an implementation plan⁶ of activities for the achievement of results with the defined implementation deadlines and they identified the support they would require for the implementation of the stated digital strategy.

Before termination of the school year, we carried out a refresher workshop for school project teams in order to conduct self-reflection using the Selfie tool, after which the educational institutions undertook another self-reflection. Based on the findings of the second Selfie assessment, educational institutions that were included in the project supplemented their digital strategies.

6. More on digital strategy planning is available in the handbook, *Zakaj digitalna strategija? (Why Digital Strategy?)* in the chapter, Recommendations and examples as a support in designing digital strategies.

2. Raising Digital Competence Portal

Associates of the project analysed the records in digital strategies drawn up by schools. Based on the findings, the Raising Digital Competence portal was set up, intended to support professional development of headmasters, educators, teachers and other educational institution staff in raising digital competence and offering various possibilities for professional growth in the area of digital competence to users seeking improvement.

The Raising Digital Competence portal presents competence areas defined by the framework, Dig-CompEdu (https://www.zrss.si/digitalna_bralnica/digcompedu-evropski-okvir-digitalnih-kompetenc-izobrazevalcev/): Professional engagement, digital resources, teaching and learning, assessment, empowering learners and guiding and supporting learners.



Figure 2
The Raising Digital Competence portal



<https://education.ec.europa.eu/sl/selfie>

Competence levels follow the upgraded Bloom's taxonomy and define individual cognitive levels of each learning process from "remembering" and "understanding" to "applying" and "analysing" and finally "evaluating" and "creating" in the area of digital competence. By using descriptors, the users can recognise and decide how to act in order to upgrade their competences with regard to the current level they identified by using the self-assessment Selfie tool for teachers.

Figure 3
Levels of competence



Adapted from: Redecker, C. (2018). *European framework for the Digital Competences of Educators: DigCompEdu*. National Education Institute Slovenia (p. 27)

The portal offers various types of training (seminars, workshops, conferences, webinars/e-lessons and various resources: handbooks, articles, recordings, interactive resources, practice examples and professional solutions etc. which can assist a teacher in assessing the sensible use of digital technologies in classes.

Figure 4
Available training programmes on the Raising Digital Competence portal (DDK portal) (<https://projektddk.splet.arnes.si/usposabljanja/>)



The screenshot shows the 'Usposabljanja' (Training) section of the DDK portal. It features a navigation bar with 'Kompetenčna področja', 'Ravni doseganja kompetenc', 'Usposabljanja', 'Viri', and 'SELFIE'. The main content area displays a large image of a training session with the word 'Usposabljanja' overlaid. A dropdown menu is open, listing 'Seminarji', 'Delavnice', 'Konference', and 'Webinarji/e-Urlice'. Below this, there are icons for 'Seminarji' and 'Delavnice'.

Portál DVIG DIGITALNE KOMPETENTNOSTI nudi različne oblike USPOSABLJANJ, ki so v podporo profesionalnemu razvoju vzgojiteljev, učiteljev in ravnateljev na področju pedagoških digitalnih kompetenc.

Izbirate lahko med:

- Seminarji, kjer boste kot aktivni udeleženci spoznali raznolike učinkovite didaktične rešitve uporabe, jih preizkusili v praksi in izmenjali svoja spoznanja v zaključku. Seminarji bodo s **Početna zasebnosti**

The portal also provides basic information on two self-assessment tools: The Selfie for teachers and the Selfie for schools.



Figure 5
Presentation of the Selfie tool on the DDK portal

The screenshot shows the DDK portal interface. At the top left is the logo for 'dvig digitalne kompetentnosti'. The navigation menu includes 'Kompetentna področja', 'Ravni doseganja kompetenc', 'Usposabljanja', 'Viri', and 'SELFIE'. The 'SELFIE' menu item is highlighted. Below the navigation, there are two buttons: 'SELFIE za učitelje' and 'SELFIE za šole'. The main content area is titled 'The SELFIE for schools' and includes the following text:

What is a SELFIE?

A SELFIE is a free online tool that helps schools assess how they use digital technologies for innovative and effective learning. The SELFIE tool enables schools to get an overview of the current state of their use of digital technologies while taking into account the attitudes of teachers, students and school leadership representatives. This self-assessment procedure can help schools establish a dialogue regarding those areas which can be improved. A SELFIE also enables schools to monitor their progress over time.

What is actually assessed by the SELFIE tool?

The SELFIE tool uses a series of questions for teachers, students and school leaders to assess the ways in which digital technologies are used for teaching and learning at a school. Questions for school leaders are mainly focused on the school's strategies and practices related to the use of digital technologies. Questions for teachers mainly relate to teaching practices, while questions for students are focused on their experiences and learning practices related to the use of digital technologies. Schools can adjust the tool by adding questions corresponding to their circumstances.

WHO IS IN THE BACKGROUND OF THE SELFIE tool?

At the bottom right of the screenshot, there is a button labeled 'Poljika zasebnosti'.

The training programmes offered have been prepared by educational and management staff to promote the sensible use of digital technologies and have provided support in developing and upgrading digital didactics.

With the acquired expertise regarding advanced methods of teaching and learning that puts the focus on inter- and transdisciplinary and experiential learning, they will influence the development of critical creative thinking, analytical abilities, digital capacities as well as other general and professional competences of learners.

3. Providing information about the project

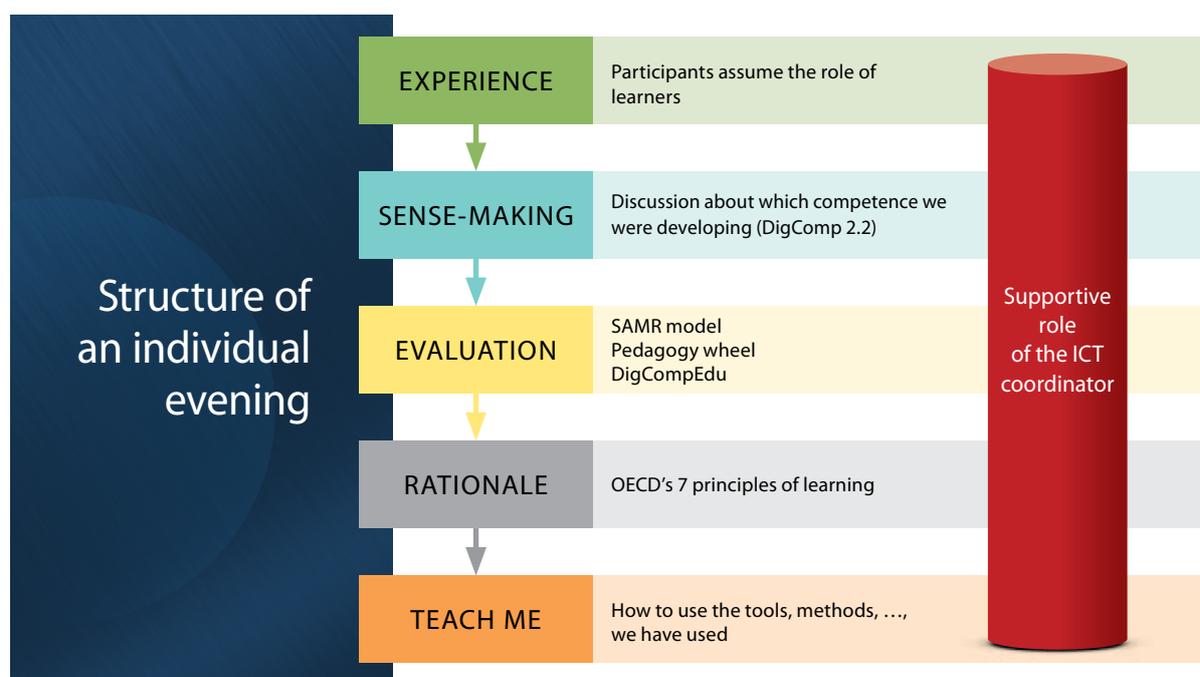
The DDK project and portal were presented at several conferences and various expert meetings attended by educational institution educational and management staff. All of this considerably increased the demand for participation at various events and training programmes that were developed and carried out during the project. With its carefully considered content and the training implementation model, we also noticed that it aroused the interest of staff from schools that had decided not to participate in the project.

4. Training carried out within the DDK project

4.1 Digital Education Week (TDI)

In the DDK project, we came up with the model most suitable (in terms of content as well as organisation) for the widest possible group of professional staff employed at all levels of education. We adopted the implementation form of the Digital Education Week (TDI) from the project, Innovative pedagogy 1 : 1 (Innovative learning environments supported by ICT). The training programmes were conducted exclusively online, for five consecutive evenings. The duration of each session was 90 minutes and the participants were given an active role: every evening they shared their reflections, in written form, on what they had seen and heard. In the course of project implementation we carried out two digital education weeks. Recordings of all of the evenings are available on YouTube uploaded by the National Education Institute Slovenia⁷.

Figure 6
Digital Education Week (TDI) concept



4.1.1 Digital Education Week 1 (TDI 1)

The first week of digital education was held between 21–25 November, 2022. For the training content, we chose Area 6 of DigCompEdu, Facilitating Learners' Digital Competence. Namely, this area includes the various content forming a component of digital competences required by educational staff to help learners acquire digital skills.

We were surprised by the overwhelming response since between 1,500 and 1,800 participants viewed the event each evening, and most of them also submitted their reflections of the experience. As some of the reflections were thorough and written with great consideration, we included them in the handbook.

7. TDI 1: <https://www.youtube.com/playlist?list=PL9YiKGs9OJ3vLsWWek4SjocojtOrrcdz>
TDI 2: https://www.youtube.com/playlist?list=PL9YiKGs9OJ3P8jKu3stKZg_erV3KaQwN

Number of reflections in the TDI classroom and number of views of YouTube videos

	Number of reflections in e-classroom	Number of views on YouTube	Average view duration (min)
Monday	1,968	3411	42.25
Tuesday	1,894	Lane 1: 2154	43.01
		Lane 2: 1578	42.14
Wednesday	1,872	Lane 1: 2017	48.56
		Lane 2: 848	36.18
Thursday	1,836	Lane 1: 1878	51.03
		Lane 2: 974	36.40
Friday	1,545	1,938	41.02
Total for the week	9,115	14,798	42.57

With the lectures and workshop content of the first week of education, we tried to encompass all levels and areas of education. Over five educational evenings, lecturers and practitioners, along with the participants, were provided with an open space for discussion among various stakeholders – from practitioners to decision-makers – about the opportunities and challenges of digitalisation in education. They indicated new possibilities in searching for common innovative and effective learning and teaching approaches and used examples of good practice to present solutions in the fields of information literacy, communication and collaboration, creation of digital content, and the safe and responsible use of the Internet and problem solving.

Figure 7

Videos of the first week's digital education content of the featured on the National Education Institute Slovenia's YouTube channel and access to the content.



The screenshot shows a YouTube video player interface. The video title is "TEDEN DIGITALNEGA IZOBRAŽEVANJA" (Week of Digital Education) on Monday, November 21, 2022, from 19:00 to 20:30. The video content includes a tree graphic with colorful circles and text describing the event's focus on digital competencies. A sidebar on the right lists five video segments with their respective view counts: 1. Introduction (1,335 views), 2. Round table (2,314 views), 3. Presentation by Nine Jelen (1,424 views), 4. Presentation by Simona Dražiča (1,314 views), and 5. Presentation by mag. Irene Gole (1,362 views). The video player shows 79 likes and a 'Naročite se' (Subscribe) button.

A statement of a TDI 1 participant

I was most inspired by the fact that we live in a world where the line between what is real and what is not is becoming increasingly blurred. We are surrounded by alternative facts which overwhelm us by a plethora of information. We must pay particular attention to reinforcing the role of the school, where we must provide adequately qualified educators handling this knowledge. Much more work will be required and teachers will be increasingly important as they guarantee a certain value. Of course, teachers will have an important task themselves to identify relevant and correct information which they can pass on to pupils while encouraging them to be attentive and to have a critical attitude towards all the acquired information. Of course, this work needs to be carried out permanently and not only in the future.

(M. B.)

Above all, I realised that the use of various online tools contributes to improving pupils' progress, motivates them to be more active, to be more closely engaged in the learning process while using those tools. I am pointing out positive aspects of online tools. By using them, pupils achieve higher, more complex learning outcomes.

(T. F.)

What do I tell kids tomorrow from what I learned today? The idea of organising a day with responsible use of the Internet at lower primary level is certainly excellent and worth including in the annual work plan. On the other hand, the lecture on pre-school children was very alarming. It requires a serious consideration that a lot still needs to be done in this area. Raising awareness among children is one side of the coin, while the other (and even more important in my opinion) side is that we must draw the attention of parents and raise their awareness, encourage and teach them to seriously begin addressing the problem and protect their children from the dangers of the Internet. Using the right approach, the Internet can be a very useful tool to acquire knowledge/information and, at the end of the day, connect people so that they are able to listen and talk to each other even when distance/illness makes it impossible.

(A. V.)

4.1.2 Digital Education Week 2 (TDI 2)

The second week of digital education was carried out between 5–9 June, 2012. The contents were intended to support class teachers in their care for learners' health and well-being and in preserving school as a safe and learning environment. The lecturers presented theoretical starting points, examples of good practice and various activities in the field of digital and personal development as well as social key competence of children at primary and secondary school levels. Examples of good practice encouraged the participants to reflect on the development of competences in the area of security, information literacy, communication and collaboration, empathy, flexibility and self-regulation etc.

Among the reflections submitted by the participants of TD 1, the content that was pointed out most frequently was related to the importance and awareness of Internet (in)security, respectful communication and good collaboration as well as an empathy in the virtual environment. Recognising that the themes mentioned are a challenge in a virtual as well as real environment, we organised the second week of digital education shortly before the termination of the school year 2022/2023. The central topic on each evening was to support class teachers in their empowerment of learners and care for the health and well-being, and the preservation, of the school as a safe and stimulative learning environment. An exceptional number of educational institution educational staff participated in TDI 2 as well.

I am aware that we are highly vulnerable on the Internet if we are unfamiliar with basic security principles. It is right to familiarise children with the pitfalls in the first educational period and to equip them with knowledge of how to avoid inappropriate content. The previous week, we celebrated a day of tolerance and friendship at our school. The central theme of our day was the slogan "It only takes a kind word to make someone's day". Among other things, we discussed the power of words. Of course, we touched upon the subject of embarrassment, we refreshed our knowledge of online etiquette and emphasised the power of the words we say or write. By carefully steering the activities into this direction, teachers (together with parents) can largely contribute to raising digital competence. At the class meeting, I will present the Safe.si website and register pupils for the "Well-being and the Internet" contest. I am convinced that the discussion about this topic will raise new questions which we will then be able to answer together.

(J. Č.)

Number of reflections on TDI 2 and the number of views of YouTube videos

Day	Number of registrations in Confiva	Total number of submitted reflections, exported from Forms	"Screened" ^[1] number of reflections submitted	Number of views in Confiva	Average view duration (min)
Mon, 5 June. 2023	1,920	1,406	1,312	–	–
Tue, 6 June. 2023	1,920	–	–	1,176	267.06
Wed, 7 June. 2023	1,920	–	–	1,154	
Thu, 8 June. 2023	1,920	–	–	1,094	
Fri, 9 June. 2023	1,920	1,156	1,079	–	–

^[1] duplicate reflections were eliminated from the total number of submitted reflections – in some cases, a single participant submitted several reflections.

The lecture on peer-to-peer violence was very informative. After the lecture I thought again how important it is to search for new ways of protecting children from violence and to empower children to be able to protect themselves from violence. Schools are decidedly responsible for providing a safe environment. Therefore, we will dedicate a few words to this topic in class tomorrow. I will tell the children they can use the words “no”, “I don’t want to...” and “I don’t like it” in order to protect themselves from violence. I will also tell them that violent behaviour is not an appropriate response when exposed to violence. Otherwise, it was good to hear again that it is important for a school or a teacher to have a plan. What I remembered the most, however, and this is what I will try to do next time in class, is that it is not enough for a child to just apologise for their violent behaviour. Instead, we should talk about it and they should tell us how they intend to make a difference next time.

(T.V.)

In addition to parents, we (i.e. teachers/class teachers/counsellors) are the ones who can do a lot of good and be a stimulation for pupils, although families ultimately have a greater impact on their children. Where there is no collaboration between parents and school, or the level of collaboration is inappropriate, the progress of a child who requires guidance consequently becomes slower. School must walk in parallel with parents and only then can we expect progress in the true sense of the word. Today’s lecture only confirmed my thinking. Pupils’ progress is at its greatest when a teacher/class teacher/counsellor is trusted by parents to be acting in the best interest of their children. Also, pupils take the matter much more seriously and are stimulated when they see that their parents are not acting against a school or its teachers, but they trust them to do the right thing. A child that has the full support at home, as well as in school, has a well-prepared backpack for life that brings along a variety situations.

(M. H.)

... collaboration with parents can be a partnership with a common goal, i.e. a child’s benefit. Ground rules can be set by a school in its documents, while a teacher presents them to parents and implements them. It is also important to be aware of one’s own feelings when facing behaviourally challenged children and to provide a safe and stimulative learning environment for them. We need to be able to identify strong areas and to focus on them.

(A .Š.)

TDI 2 presented a new challenge to the training organisers: It was undertaken on the online platform, Confiva, that enables participant interaction, dissemination and networking of knowledge, video transmission and local support in carrying out a digital event. As the Digdaktika conference was available to remote participants on the Confiva online platform, the TDI 2 event also served as a platform test.

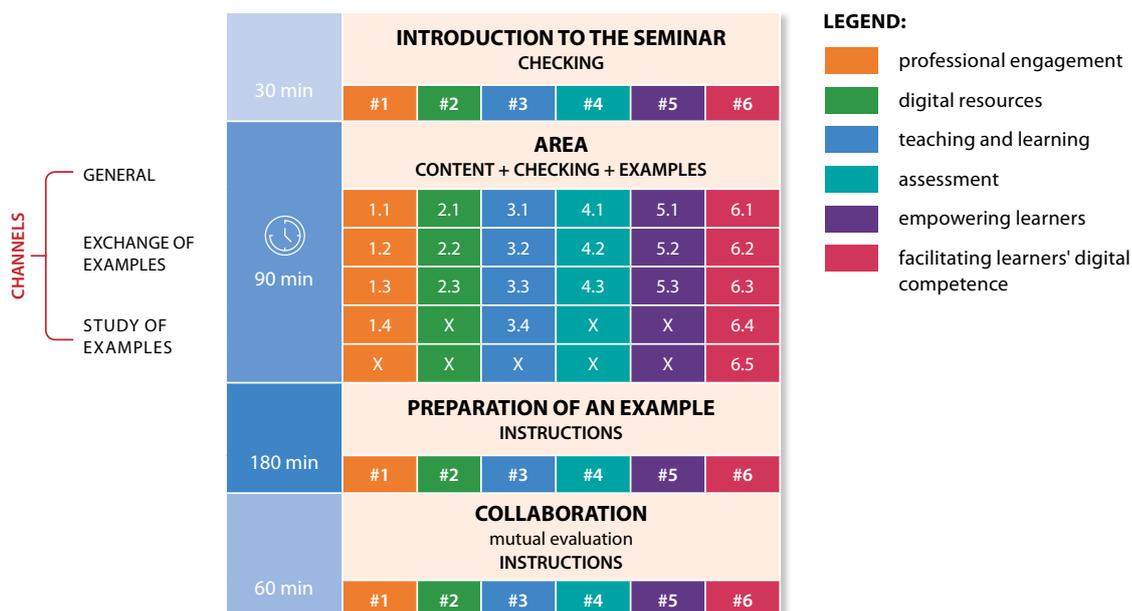
Figure 8
Digital Education Week 2 (TDI 2) layout



4.2 Seminars for raising digital competence

The authors of the seminars met for the first time and started to plan these seminars in June 2022, while the real work began in August of the same year. At that time we formed groups of authors (pedagogical consultants from the National Education Institute Slovenia and teacher practitioners) and critical friends for all of the six seminars, following the model of six competence areas according to DigCompEdu. Members of those teams began developing the content for individual sub-competence areas of each of the six competences in Moodle and MS Teams. In December, we tested the six seminars, we conducted an evaluation and, based on the findings, we made certain adjustments and improvements.

Figure 9
Structure of DigCompEdu seminars



The purpose of the seminars was to explore and upgrade the participants' own digital competences along with the use of Moodle or MS Teams while performing the tasks. The seminars were set to acquaint the participants with Moodle and MS Teams tools because they had already tried out those particular tools previously, learned how to use them and included them in their practice. The participants who successfully conducted self-education attained the B1 level of competence.



Figure 10
Basic descriptor of B1 level



At the inclusion stage, educators test digital technologies in various environments and for various purposes and include them in a variety of their practices. They creatively use them to improve various aspects of their professional engagement and they are really keen to expand the range of practices. To advance to a higher level, they only need a little more time for testing and reflection, collaboration and the encouragement of educators and to then exchange their expertise.

From January to April 2023, 30 authors carried out 6 online seminars for management and educational staff, which were based on the European Framework for the Digital Competence of Educators DigCompEdu:

- Seminar for the development of digital competences of educators in the field of professional engagement,
- Seminar for the development of digital competences of educators in the field of digital resources,
- Seminar for the development of digital competences in the field of teaching and learning,
- Seminar for the development of digital competences in the field of assessment,
- Seminar for the development of digital competences of educators in the field of empowering learners,
- Seminar for the development of digital competences in the field of facilitating learners' digital competence



Figure 11
Competence areas



European Framework for the Digital Competence of Educators DigCompEdu (p. 13)

We recommended headmasters and leaders of school development teams to participate in seminars for the development of digital competences of educators in the field of professional engagement, while other members of development teams were recommended to participate in 2 seminars covering the remaining five areas according to their choice.

Statistics regarding participants after 4 conducted seminars

		No. of hours of implementation	No. of repetitions	No. of registrations	No. of successful participations
Moodle	1. Professional engagement	16	4	148	99
	2. Digital resources	16	4	138	92
	3. Teaching and learning	16	4	254	170
	4. Assessment	16	4	151	97
	5. Empowering learners	16	4	131	89
	6. Facilitating learners' digital competences	16	4	166	101
MS Teams	1. Professional engagement	16	4	269	142
	2. Digital resources	16	4	246	129
	3. Teaching and learning	16	4	427	234
	4. Assessment	16	4	225	113
	5. Empowering learners	16	4	202	102
	6. Facilitating learners' digital competences	16	4	221	104

192

36

2578

1472

4.3 Online courses and workshops provided by Arnes



Figure 12

Catalogue of SIO-training courses carried out by Arnes (<https://izobrazevanje.sio.si/?category=spletni-tečajji>)

SIO SLOVENSKO IZOBRAŽEVALNO OMREŽJE

NOVICE IZOBRAŽEVANJE REŠITVE PROJEKTI ZAKONODAJA SKUPNOSTI

Kje in kdaj se lahko kaj naučim

Izobraževanje: Vse Dogodki Spletni tečajji Delavnice Konference

Filtriraj IŠČI ...

Spletni tečajji
MOOC - Iz šole v splet
Na množičnem spletnem tečaju iz šole v splet boste spoznali, kakšna je vloga IKT v družbi in njena raba v šolstvu.

Spletni tečajji
MOST (MOOC) - Varna raba interneta in naprav
Spletni tečaj MOST-V obravnava tematiko spletne varnosti in varne

Spletni tečajji
MOOC - Moja digitalna identiteta
Vsi učitelji smo v zadnjem času bili prisiljeni v polni meri uporabljati informacijske tehnologije. Uporabljali smo različna orodja in vire. Številni uporabljajo nove rešitve že leta, pa se

During the course of the project, Arnes carried out selected workshops and online courses that already existed, it upgraded the existing online course **Safe use of the Internet and devices** and prepared the new online course **My digital identity**.

Based on the findings presented in the report on the conducted Selfie, we identified two areas that needed to be given special emphasis: "Safe and responsible use of the Internet" and "Identity management".

Therefore, we upgraded the existing online course: Safe use of the Internet and devices, and we prepared a new course: My digital identity.

Both online courses were identified as fundamental. We recommended that the schools included in the project ensured that one quarter of educators from their school teams participated in each of the two courses. Participation was open to all educators from all educational institutions.

We began carrying out fundamental online courses in the beginning of October 2022 and the remaining courses took place according to a regular time schedule in the autumn and spring terms. Live and partially online workshops were carried out simultaneously.

Training title	No. of hours of implementation	No. of repetitions	No. of registrations	No. of participants in live event	No. of successful participations
Workshop: Video portal and video editing	8 (4 live and 4 online)	67	649	649	353
Workshop: The use of splet. arnes.si	8 (4 live and 4 online)	7	64	64	31
Workshop: Simple online surveys	8 (4 live and 4 online)	7	61	61	46
Cycling proficiency test	3 hours live	1		51	
MOOC: Online surveys	16 in online classroom (OC)	4	398		238
MOOC: Digital identities (for IT specialists, directory administrators)	16 in OC	3	233		99
MOOC: Directing and managing an educational institution	16 in OC	3	180		68
MOOC: Online presentation of an educational institution	16 in OC	3	187		82
MOOC: Multimedia contents	16 in OC	3	262		113
MOOC: Safe use of the Internet and devices	14 in OC and 2 hours live	3	1231	181	181
MOOC: Safe use of the Internet and devices (DDK project)	16 in OC	6	2711		1875
MOOC: My digital identity	16 in OC	7	2827		1924
Total		114	8803	1006	5010

4.4 Digdaktika – final conference of the project

Final conference of the project Raising Digital Competence (<https://digdaktika.splet.arnes.si/>) entitled “Digdaktika”, organised by the National Education Institute Slovenia, was held on 30 August 2023 at the Cankarjev dom congress centre in Ljubljana. At the conference, more than 1,600 participants and more than 100 lecturers (representatives of government services, European institutions, universities, schools, kindergartens and other educational institutions) gathered. Participants in the study events attended lectures of their choice, each lasting at least two hours. The Digdaktika conference could be followed live or online.



Figure13:
The Digdaktika conference website



At the conference, the results of the DDK project were presented. Within the project, we designed, tested and evaluated various solutions for the development of digital competence (various training and education courses, supportive online environment for the efficient use of digital technologies, tools for the self-assessment of digital competences, digital resources, examples of good practice, establishment of learning communities and recommendations to improve digital competences).

The Digdaktika conference aimed at transferring experience from the DDK project to the participants of the conference, thus encouraging them to raise digital competences, to use innovative practices in their work, to guide and support learners, to acquire and upgrade their digital competences and to engage in the sensible use of digital technologies.

Lectures and presentations provided answers to some of the questions arising from the digitalisation of education, and opened the space for reflection by covering the following topics:

- changed habits of teachers and learners due to the use of digital technologies,
- the importance and role of digital strategies,
- artificial intelligence,
- development of digital didactics,
- examples of good practice for facilitating learners' digital competences.

Conference participants were given the opportunity to listen to educators who presented activities for facilitating learners' digital competences through examples of good practice, interactive posters and in-class simulations.

5. Added value of the project: the path to the digital transformation of educational institutions

In the DDK project, we presented the fundamentals and indicated the path leading to digital transformation of schools. A valuable partnership was forged with 217 schools which continued throughout the entire duration of the project. Here an important role was played by school project teams which also included headmasters. We supported them with the fundamentals, a template and a vision to help prepare a digital strategy, training, materials and the support of regional consultants. The task of the school project teams was to develop didactical approaches which could be transferred to pedagogical practice for working with learners. School project team members ensured that the knowledge and skills acquired during training were used in the development of didactical approaches and implemented in their teams. In this way, they raised digital competence of their school teams, encouraging them to learn from one another.

Within the project, we prepared a variety of content and developed an organisational model that enabled members of school development teams, educational staff from the participating educational institutions and all the remaining interested educators to raise their digital competence.

a) Technical aspect

The DDK project was focused on raising digital competence of educational institution educational staff in such a way that they could embark on the path of education as a group or a community and no longer just as individuals. Also, working in very different educational environments (MOODLE and MS Teams) was immediately brought into focus of the project. The assumption of working in two different environments placed the focus of attention on knowledge and technical solutions in the field of digital identities.

As the participating educational institutions expressed the need for training in the field of digital identity, Arnes responded by preparing a new online course, My Digital Identity. Previously, Arnes had already issued the Digital Identities course, which, however, was intended for directory administrators at educational institutions. The new course that was developed within the project is intended for teachers new to the world of in-class ICT users and puts the focus on the main characteristics of user accounts, safe use of the Internet and copyrights. During the promotion of online courses, Arnes detected the need for a proposed path through various forms and levels of education, to which it responded by creating a comprehensive presentation of all forms of education and services.

Technical aspect of the use of digital identities refers to many years of work and orientation of Arnes towards the use of a single user account that would allow users to maximise the number of services used at work. The National Education Institute, Slovenia selected Microsoft Office 365 as the alternative environment. However, the project was faced with the fact that not every educational institution has an established AAI – MMS Office 365 connection. Therefore, Arnes provided support to project participants in organising workshops covering the aforementioned topic.

The users of MS Office 365 environment that use the AAI login were faced with two types of technical challenges during the project. The first one referred to the way in which the users of one organisation were involved in the work of other organisations, and the second one was related to connections and, consequently, the need for re-authentication of users. Arnes successfully addressed both challenges to the extent that Microsoft was able to eliminate them from its system.

Arnes participated throughout the project implementation. The key conclusion is that its services were effectively provided in all steps of education – from preparation, presentation and organisation of training courses to providing support in project coordination as well as in organising and implementing the concluding conference. The key services provided by Arnes during the project include Arnes Splet, Arnes Učilnice, Arnes Video, SIO portal and SIO communities.

b) Didactical aspect

The project partners supported the development activities of school development teams by providing background expertise, recommendations and content-related guidance through nationwide and regional professional gatherings and by providing training for all the educational and management staff at educational institutions. Expert materials, with examples included of good use, were prepared (translation of DigComp 2.2, Digital Competence Framework for Citizens with new examples of knowledge, skills and attitudes; a professional monograph with recommendations for developing digital strategies, guidance and support to learners in acquiring digital competences was prepared. This marked the beginning of a new chapter in Slovenian education, and focused on development of digital didactics and support to educators in its introduction. The solutions developed within the framework of previous development tasks and projects were implemented (e.g. ATS, ATS STEM, e-šolstvo, e-Šolska torba, Inovativna pedagogika 1 : 1, POKIT and KAKO portal etc.).

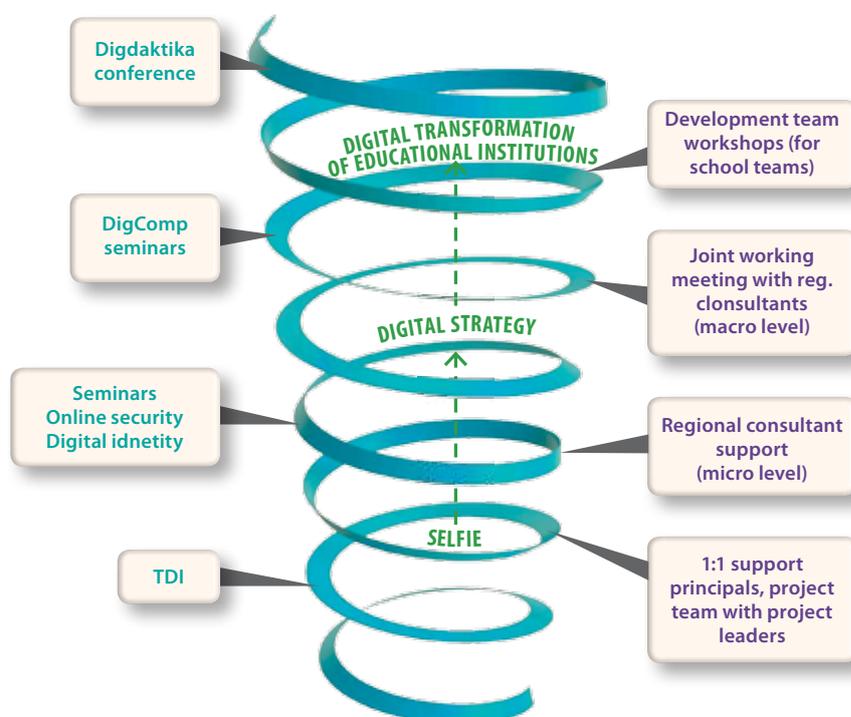
We encouraged school development teams to engage in action planning:

- determining the current level of digital competence of educational and management staff and learners,
- Continuous assessment of the work performed and progress achieved,
- updating and improving digital strategies within educational institutions,
- development, implementation and dissemination of digital didactics.

In addition to enabling educators to participate in all the training, they were able to use the materials we developed during the project and published on portalu DDK (<https://projektddk.splet.arnes.si/>). With all the activities presented, we laid the foundation for introducing digital didactics into pedagogical practice.

Figure 14

Learning community; development of digital competence in an educational institution

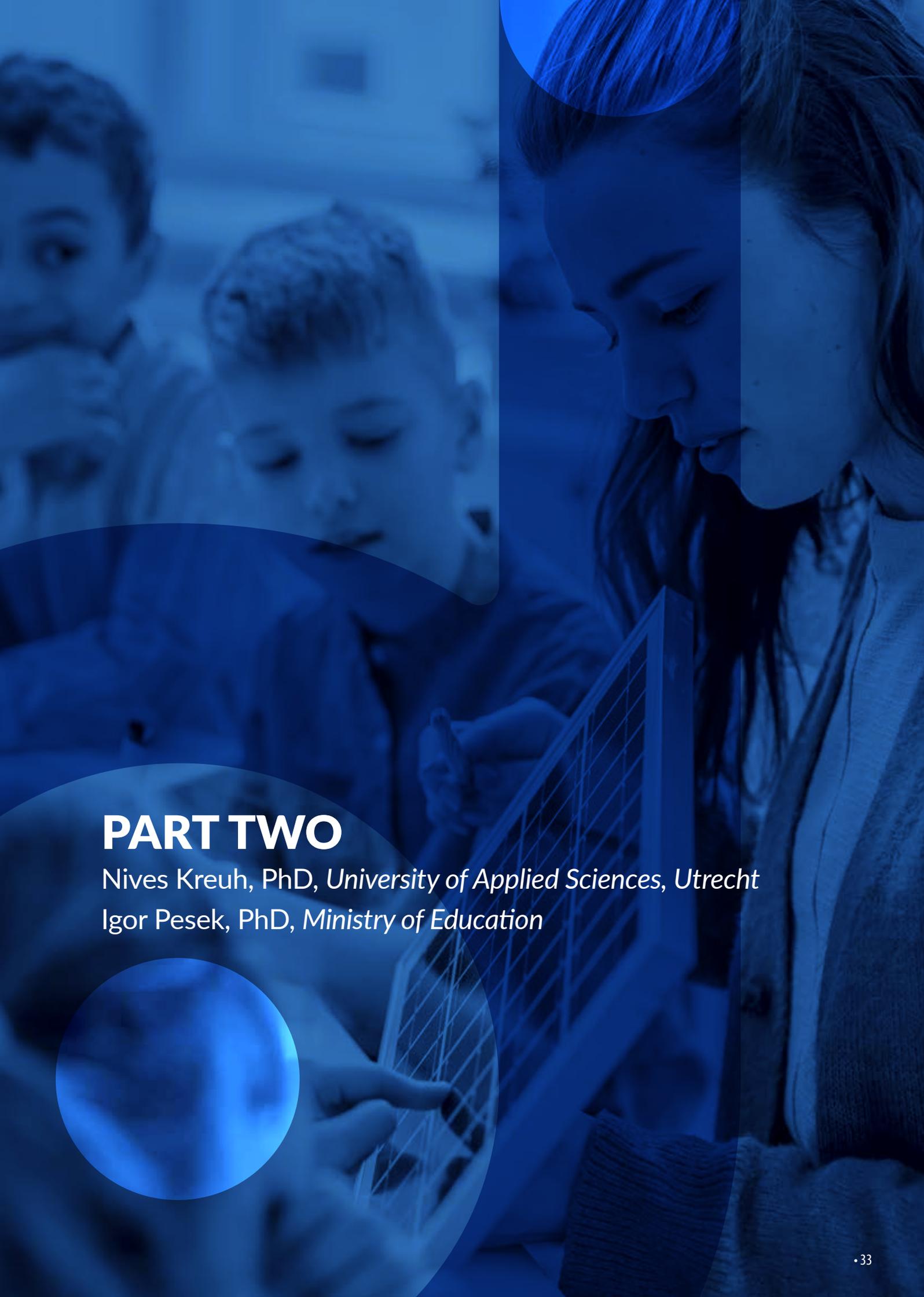


With the emergence and use of digital technologies in education, the need for new fundamentals in digital didactics emerged, in addition to the need of pedagogical and reflective knowledge as a result of fast changes in the modern world. For the in-depth development of digital competence of educational staff, it is also necessary to understand the theoretical background to digital didactics, which connects the technological and didactical aspect.

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PART TWO

Nives Kreuh, PhD, *University of Applied Sciences, Utrecht*
Igor Pesek, PhD, *Ministry of Education*

The black and white world of digital didactics

Digital education, i.e. the use of digital technologies in the classroom, sounds like the lyrics of the song Black and White World (Crno-bijeli svijet) by Riblja čorba. Although it is a generational metaphor (some of us are not so young any more), it is relevant nonetheless. Namely, on the one hand, and for quite some time, we have been living in a cyber world in which the awareness of the importance of lifelong learning is of crucial importance, while on the other hand, we cling to analogue habits and very slowly change pedagogical practice from analogue to digital (or perhaps even cybernetic), which is a peculiar paradox. There are several reasons for our slow advancement.

In the field of education, we have been witnessing challenges for quite some time – namely, technologies have been treated separately from didactics and content, although integration of all three components is the only true possibility when it comes to addressing the requirements of learning in the 21st century (Mourlam and Herring, 2016). Mishra and Koehler (2006, pp. 1025–1026) also described this integration in detail, initially naming it TPCK (Technological, Pedagogical, and Content Knowledge) and later renaming it TPACK (Koehler and Miskra, 2009, pp. 60–70).

The other reason is somewhat broader and – as it reaches into various areas of our professional and social engagement – is not only an educational challenge. Nowadays, as artificial intelligence is well underway (also including the notorious Chat GPT and smart clothing), we are still failing to detach ourselves entirely from the book and page spatial format. The page format has always governed us, without us being aware of it. A screen or a laptop opens like a book, it emulates a page and we write on it, if only with our fingers on a smartphone. Also, all educational institutions and classrooms or lecture rooms are built in accordance with the page principle. It appears as if the technological revolution hasn't changed anything in our knowledge, pedagogy or the domain in which education has resided ever since printing was invented. However, emerging technologies are increasingly forcing us to change the spatial format dictated by the book and the page (Serres, 2015, pp. 20–69).

Consequently, as the page format has been changing to digital formats that exist on websites and devices, the way of reading and understanding digital texts has been changing as well. Digital reading and writing is based on new text types and forms, such as multimedia, hybrid and multimodal texts (Lemke, 1998, pp. 247–271), on new expectations of the so-called non-linear readers (Cagiltay et al., 2006, pp. 122–136) as well as on new activities such as online publishing (Leu et al., 2004, pp. 1570–1613), which forces us into differentiation. And, at this point, another reason for slow advancement arises, i.e. professional development of teachers and lifelong learning.

Within Europe, two important documents were adopted that defined two different kinds of digital literacy and are essential for lifelong learning. The first one is DigComp: A Framework for Developing and Understanding Digital Competence in Europe (Ferrari, 2013), which was designed and developed on the initiative of the European Commission and defines digital literacy for European citizens by 21 digital competences at three levels, while a self-assessment tool is also part of Europass. The existing document was upgraded in 2017 to DigComp 2.1: Digital Competence Framework for Citizens (Carretero, et al., 2017) and expanded to eight proficiency levels. Digital transformation of education and learning can only be accomplished through knowledge, understanding and an alteration in requirements for educators, which are outlined in the European document European Framework for the Digital Competence of Educators: DigCompEdu (Redecker, 2017).

Therefore, we have background documents ensuring that uncertainties or dilemmas as to how we can, or will, become qualified and how to change our pedagogical practice probably no longer exist. The teachers' task is to help learners make learning rational and sensible, so they do not browse the Internet at random or aimlessly but rather have a clear purpose in finding useful information and know how to do so safely and effectively. If we have believed for a very long time that knowledge is the most important thing and school is the only source of knowledge, then this is no longer the case. School must be

the place where we learn [how to acquire knowledge](#). This, however, is no longer possible today without digital technologies (Kreuh, 2019, pp. 18–19).

So, first things first or how the world is changing

First, we must understand, or remember, what essential knowledge a teacher should have. A very quick and efficient way to do it is by using Chat GPT to answer this question. We can easily check whether the answer is correct by checking the right source.

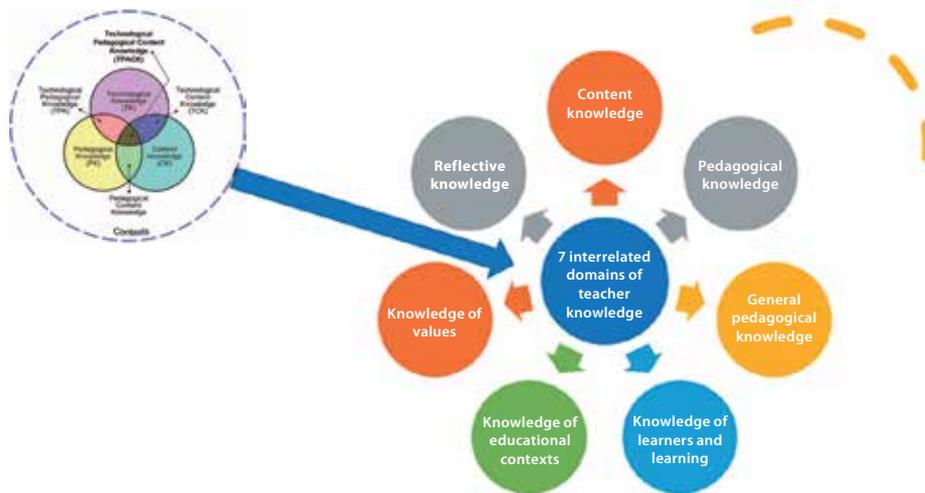
Lee Shulman, an American pedagogue and one of the most influential researchers in the field of teaching and learning, identified seven interrelated domains of teacher knowledge. These knowledge domains are as follows:

1. **Content knowledge** – this is knowledge of what is being taught, which includes understanding of fundamental concepts, principles, laws and theories in the field of teaching and learning.
2. **Pedagogical knowledge** – this is knowledge on the process of teaching and learning, including the principles of learning, planning of curricula and activities, organisation of the learning environment, guiding the class and grading.
3. **General pedagogical knowledge** – this is knowledge of how learners develop different abilities, skills and motivation for learning.
4. **Knowledge of learners and learning** – this is knowledge of various aspects of learning, such as cognitive, emotional and social aspects, and understanding how learners differ according to different factors such as age, culture, language, gender, abilities and interests.
5. **Knowledge of educational contexts** – this is knowledge of the context in which teaching and learning are taking place, which includes an understanding of different education systems, social, cultural and economic conditions that affect teaching and learning.
6. **Knowledge of educational purposes and values** – this is knowledge of the goals of education and values that are important in the educational process.
7. **Reflective knowledge** – this is knowledge enabling teachers to critically reflect on their teaching and learning and adapt to changes and new requirements of learners and society. It includes the ability of critical thinking, self-reflection and improvement of one's own teaching and learning.

(Chat GPT, *Which fundamental knowledge of a teacher is described by Schulman in 1987, 2023*)

In this part I will primarily focus on content knowledge, pedagogical knowledge and, further on, reflective knowledge. With the emergence and use of digital technologies in education, content knowledge and didactical knowledge changed and the need for eight knowledge domains emerged.

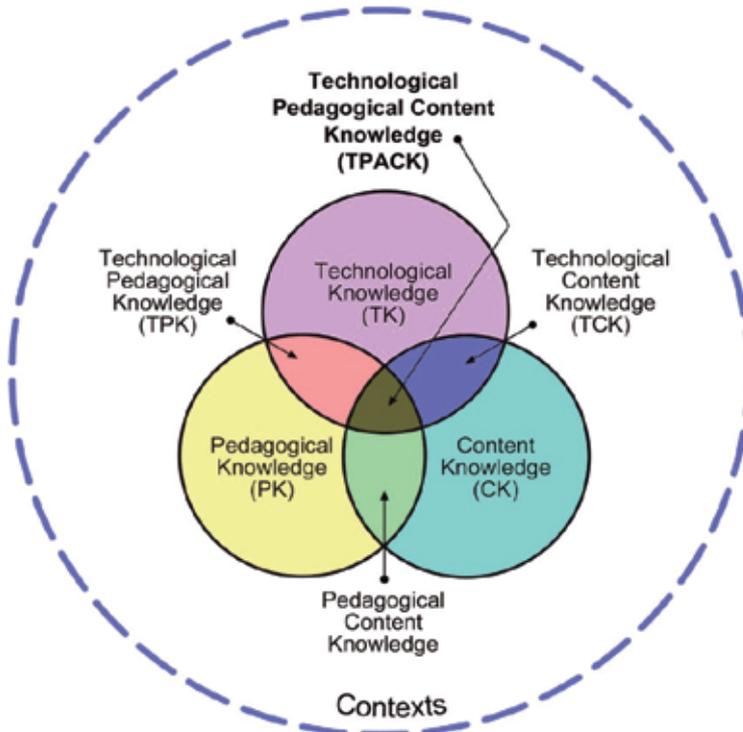
Figure 15
Teachers' knowledge domains and TPACK



Source: Shulman, L. S., 1987; Koehler and Mishra, 2009, p. 63.

In 1987, Schulman had no idea as to how these knowledge domains would change with the emergence of digital technology. The first scholars to interfere with the concept of knowledge domains were Mishra and Koehler (2006), adding technological knowledge to content and pedagogical knowledge, thus laying the foundation of *digital didactics* (see Figure 15). Our challenge here is that we knew very well how to teach individual contents and concepts etc., as we had experienced this analogue practice as learners. However, when digital technologies enter the learning process, this harmony between content and pedagogical knowledge no longer works.

Figure 16
TPACK framework and domains of knowledge



Adapted from Koehler and Mishra, 2009, p. 63.

Over the years, and after much use, the model's acronym was changed from TPCK to TPACK (Koehler and Mishra, 2009, p. 60) and it now shows three components of teacher knowledge: technologies, content and didactics. All the various combinations and fusion of these components of knowledge are equally important and are named and shown as two or three overlapping circles: technological content knowledge – TCK), technological pedagogical knowledge – TPK), pedagogical content knowledge – PCK) and technological pedagogical and content knowledge – TPACK).

Koehler and Mishra (2009, pp. 61–64) explain content knowledge as a teachers' professional knowledge of an area or subject they teach with an urgent need as it includes concepts, theories and the established methods and practices of the development of this area. Pedagogical knowledge is an in-depth knowledge of the processes and practices or methods of teaching and learning and is connected with the knowledge of educational goals, values, planning classes, knowledge of how learners learn and how to monitor and evaluate knowledge etc. Technological knowledge, however, changes constantly and pertains to the ways of thinking about, and working with, technology, i.e. different tools and resources (Koehler and Mishra, 2009, pp. 61–64).

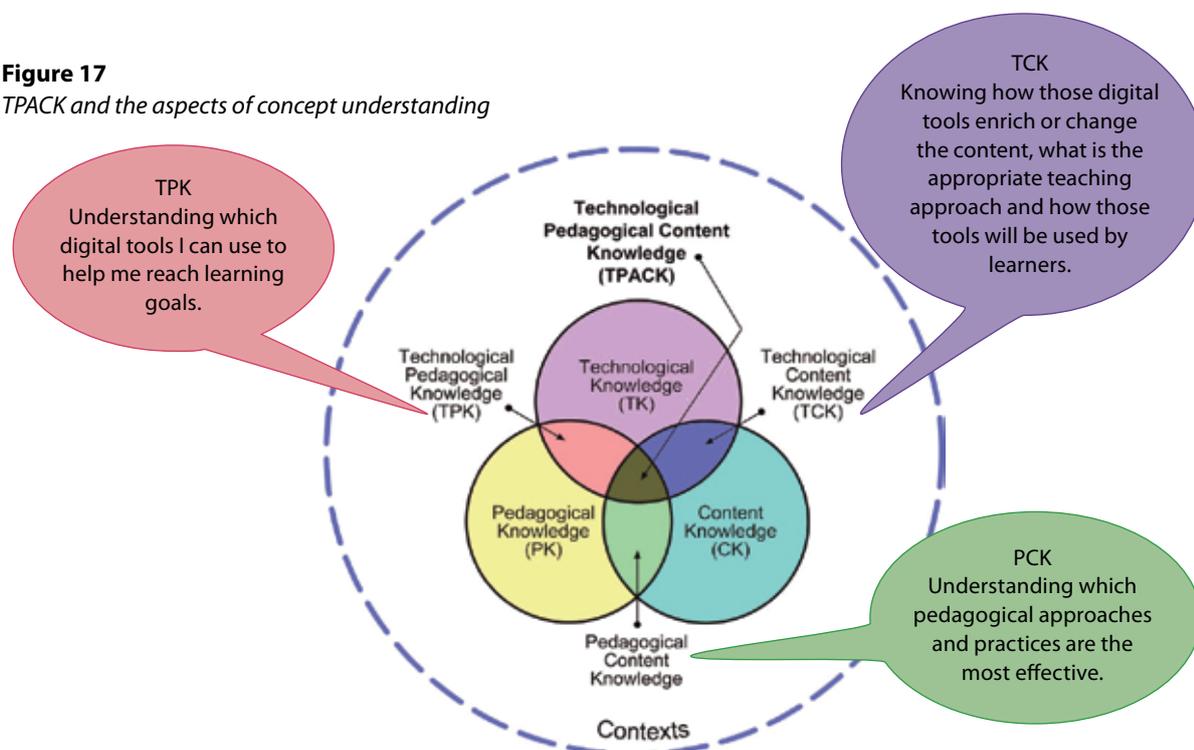
The TPACK model, however, is no longer about each of the three components of knowledge as separate entities but about all of them combined – technological, pedagogical and content knowledge is a foundation for effective teaching by using digital technologies. It requires an understanding of concepts in the use of technology, knowledge of [didactical methods in the constructive use of technologies for teaching content](#), [knowledge of how digital technologies support learners in understanding concepts and how we can use technology to build on existing knowledge to develop new epistemologies or strengthen old ones](#) (Koehler and Mishra, 2009, p. 66).

The most important aspects we need to know or understand are (see Figure 17):

- which digital tools we can use that will help achieve our learning goals and also that we know how to use them,
- how these tools will enrich or change the content, what the proper approach is to teaching and how these tools will be used by learners,
- which pedagogical approaches and practices are the most effective.

Figure 17

TPACK and the aspects of concept understanding



Adapted from Koehler and Mishra, 2009, p. 63.

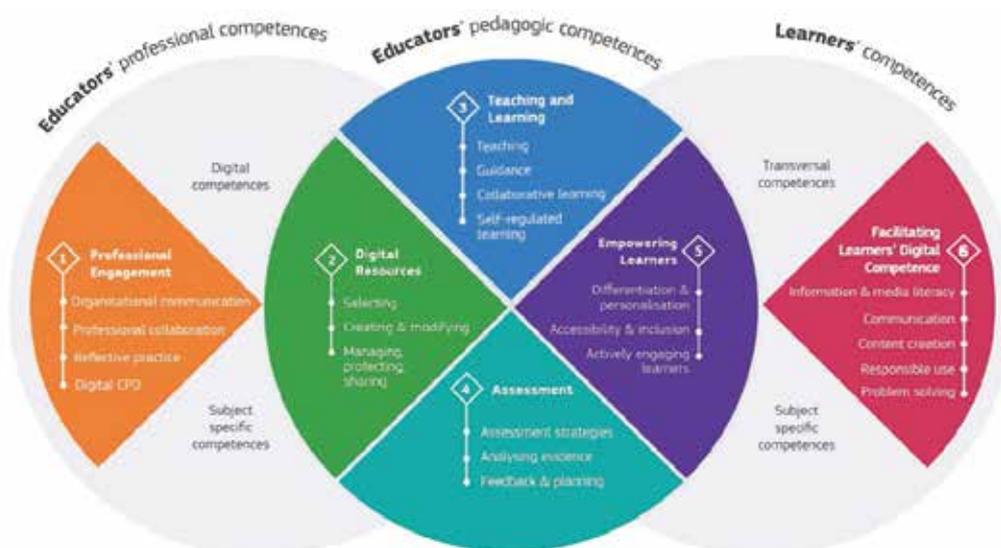
A teacher needs all this knowledge for effective planning and implementation of classes and only in this case can we talk about digital didactics. And now, of course, there is the final challenge: How do teachers know their knowledge and competences are adequate? And is it something they want to know anyway?

Self-knowledge and reflective knowledge

Schulman (1987) underlines the importance of reflective knowledge that includes critical thinking and self-reflection. Here is the opportunity to base ourselves on the frameworks of two European documents, i.e. DigComp 2.1, Digital Competence Framework for Citizens (Carretero et al., 2017) and primarily the European Framework for the Digital Competence of Educators, DigCompEdu (Redecker, 2018), which provides a broader insight into important components and areas of educators' competences – namely, without that knowledge, it is not possible to change pedagogical practice neither is it possible to talk about digital didactics.

Figure 18

The connection between digital competences of educators and learners



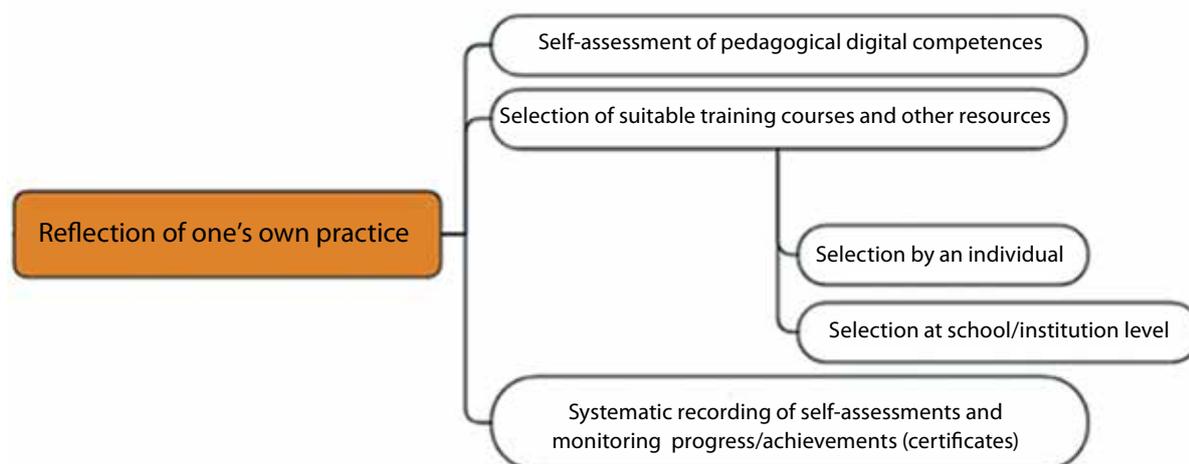
Adapted from Redecker 2018, p. 13; Carretero et al., 2017, pp. 14–15.

The key area is professional competences which leads to teachers being qualified to engage in their professional area and the manner in which they engage in their professional area. Also, qualified teachers themselves have to be digital citizens if they are to be able to support and guide their learners in acquiring digital competences by applying the following competences (see Figure 18).

Through reflective practice we develop critical judgment and care for acquisition and development of our own pedagogical digital competences, which is a component of a teacher's pedagogical work, especially in these times. Tools, such as the Selfie for teachers, POT-OS and digital competence of educators etc., are teachers' aids which help them establish or self-assess their own competences, to select suitable training programmes or other ways of acquiring new knowledge and to help select appropriate pedagogical approaches or practices for effective planning and conducting classes – digital didactics.

Figure 19

Components of reflecting on one's own practice



Source: 1-34

Planning of one's own training or training for digital didactics should begin by reviewing one's own practice. An efficient way for teachers is through the [self-assessment of pedagogical digital competences](#). This was confirmed by findings of an experiment conducted in several countries within the international project MENTEP (Abbiati et al., 2018a; 2018b). It was established that teachers firmly believe they know how to encourage learners to practice critical use of ICT (92% agreed with this statement), while after self-assessment, in which this statement was described in detail at five levels in an online tool (i.e. five statements were available to choose from and the respondents had to choose one), it was established that it was not the case (the result achieved at the self-assessed level of pedagogical digital competence was 49.9%, which means that the majority of teachers chose the statement corresponding to the third instead of the fifth level as would be expected in the introductory questionnaire) (Kreuh and Azzolini, 2018, str. 26).

There is strength in training and awareness about the importance of one's own reflection and, certainly, how one's own development is progressing or should be progressing, is a fundamental guiding principle for every individual, for an educated one in particular.

What about digital pedagogy in Chat GPT?

Digital pedagogy refers to the use of digital technologies in the pedagogical process. This means that a variety of technological solutions, such as computers, tablets, smart phones, video conferencing programmes, online portals and other digital applications, is used in teaching and learning.

In current times, digital technology is especially important as it enables remote interaction between teachers and learners and expands the possibilities of learning outside classrooms. Using digital technologies, teachers can create more flexible curricula adapted to various learning styles and the needs of learners, thus improving the effectiveness of teaching and learning.

In addition, digital pedagogy enables the development and encouragement of critical thinking, creativity and collaboration as it provides learner' with an access to a variety of sources of information and enables them to share their ideas and collaborate with classmates and teachers through various digital platforms.

Digital pedagogy is also facing certain challenges, such as providing adequate equipment and internet access, data security and privacy as well as inclusion for all learners in the process of digital learning

(Chat GTP, What is digital pedagogy? 2013)

In a study which comprised 1000 teachers from kindergartens and K12 secondary schools (Whitford, 2023), 51% were found to have already used Chat GTP in class. 88% expressed a positive attitude towards the use of this tool in teaching and learning, confirming a general benefit to be gained in educating learners. Of course, this is the field that, again, opens a black and white world or perspective of pedagogical practice and the world. Which brings us back to the beginning.

Artificial intelligence is already here. It has, and will, change the world forever. We are waiting for the moment when each learner has the opportunity to have his/her own learning assistant, when we are really able to speak about personalised and flexible learning. It is the duty of teachers to accept the challenge and prepare themselves and learners for the effective and efficient use of digital learning tools and for acquiring new expertise as well as to guide and support learners in doing so. And a very important detail: Chat GPT also works in Slovenian.

Let me conclude with a quote from Charles Darwin who claimed that "it is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change"; I hope that with the help of digital technology and artificial intelligence, we will be stronger and smarter in adapting to changes in our cyber world.

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Digital education: opportunities, challenges and the way forward

In the age of digital revolution as technologies are developing at an unprecedented speed, digital education has become inevitable and has been given urgent priority. We live in a world in which knowledge is just a click away and information spreads faster than ever. Digital education enables adaptability, accessibility and personalisation of learning, which is crucial for individuals to prepare for a modern work environment, and which is becoming increasingly technology dependent. Furthermore, digital education enables learning without geographical limitations, which opens doors to global knowledge and understanding. In this rapidly changing world, digital education is necessary in order to maintain competitiveness, innovation and progress.

The *Raising Digital Competence* project represents one of the steps towards improved digital education as it focuses on adapting education to the actual needs of individual educational institutions. With the development of adapted digital strategies and training of educators for effective use of digital technologies, the project enabled better use of the potential of digital technologies for the improvement of learning experiences and outcomes.

Digital Education Action Plan

In April 2022, the Ministry of Education adopted the Digital Education Action Plan 2021–2027⁸ (ANDI), which determines key measures and areas for the development of digital education in Slovenia. Our vision is to establish a robust and effective digital education environment which will prepare individuals for living and working in a digital and green society, in line with the most advanced countries in the world.

In this context, digital education means creation of a learning environment that enables sensible, safe and interactive use of digital technologies. The goal is to enhance knowledge and improve the competences of all education participants, with an emphasis on creativity and innovativeness. This also includes seizing the opportunities offered by digital technologies and addressing the challenges that they bring with them.

The Digital Education Action Plan addresses 6 areas as follows: national coordination, didactics of digital education, changes in programmes and work posts, education and training, digital ecosystems and education in specific circumstances. A more detailed description is provided further on.

The *national coordination of digital education* aspect is designed with a view to provide permanent and overall coordination in the field of digital education. Such coordination comprises content-related, organisational and financial aspects of digital education. The Digital Education Centre operates as a national hub, bringing together content-related contributions made by various stakeholders in the field of digital education. In this way, users are provided with a single point of access to information on the services they need in the field of digital education. This approach enables an efficient and coordinated operation in the field of digital education at national level.

The field of *Didactics of digital education* is focused on the identification and development of effective practices and teaching and learning strategies in digital environment. The main purpose of this area is to collect and analyse good practices which are applied in digital education and their upgrading and integration in an overall didactical framework.

It includes research and understanding of how to ensure the optimal use of digital technologies in educational contexts, how these technologies influence learning and teaching and how such practices and strategies can be upgraded and improved. Furthermore, this area also focuses on the synthesis of these findings and the results of scientific research in the field of digital education.

8. <https://www.gov.si/assets/ministrstva/MIZS/SDIG/JR-NOO-usposabljanja-303-35/2022/Akcijski-nacrt-digitalnega-izobrazevanja-2021-2027.pdf>

The goal is to develop comprehensive didactics in digital education which is based on evidence and will be effective in practice. This will enable educational institutions, teachers and learners to better use the opportunities offered by digital technology and to improve the quality and effectiveness of digital education.

The *changes in programmes and job positions* aspect focuses on the reform of educational programmes and regulations in order to enable the inclusion of new fundamental content, such as computer science, informatics, artificial intelligence and cyber security and the digital competences of learners, in syllabi, curricula, knowledge-based material and study programmes at all levels of education. The aim of this area is to ensure that educational programmes and job positions are adequately adapted to the demands and opportunities of the digital age.

The *education and training* aspect is intended for the reform and upgrading of the educational system and training of educational staff and other educators, with a special emphasis on digital education. The main goal is to improve pedagogical digital competences with the inclusion of fundamental computer science and informatics content in educational programmes.

Reform and upgrading will ensure that educational staff and other educators will acquire the necessary digital competences and expertise which are indispensable for effective teaching and mentorship in the digital age. This includes the understanding and use of digital technologies in a pedagogical context, development of strategies for effective digital teaching and learning and the use of digital tools to improve the learning experience.

The Ministry of Education prepared the project, Digitrajni učitelj (Digistainable Teacher). This is intended for training educational and management staff at educational institutions in the field of pedagogical digital competences. The aim of the Digistainable Teacher project is to empower those workers through training which encompasses modern methods both within as well as outside educational institutions.

The project Digipermanent Teacher encourages a constant active role for participants through interactive forms of learning that include experimenting with new approaches in classes, mutual learning and assessment. Furthermore, it also includes real-time progress reviews made by those participating in order to ensure that their digital competences and knowledge are constantly being improved and developed. This approach enables educational and management staff of educational institutions to effectively adapt to the digital age and benefit from the opportunities offered by digital education.

The *digital education ecosystem* aspect is intended to provide an all-encompassing, effective, functional, safe and motivational supportive environment for all those involved in education. This ecosystem includes numerous essential components that together support effective digital education.

- a. Infrastructure
- b. Platforms, tools and services
- c. Educational e-contents
- d. Management of educational institutions
- e. Internal and external assessment of progress made in ANDI implementation
- f. Ensuring equality and equal opportunities
- g. Parental involvement
- h. Inclusion of other stakeholders
- i. Cybersecurity
- j. Legal bases for the promotion of digital education

The *education in specific circumstances* aspect is intended for the preparation of protocols for a quick and efficient transition to distance teaching and reacting to other special circumstances. The main goal of this area is to ensure that the educational system is prepared and capable of rapid adaptation and continuation of education even when traditional methods of teaching fail due to unforeseen circumstances.

Emerging technologies

Emerging Technologies have always been present in the realm of education, ever since the beginning of radio, television, computers and interactive whiteboards. Although these technologies were not initially designed for education, they have a potential to enrich the learning experience and improve learning outcomes.

However, it is essential that these technologies are used in a sensible and effective way. It means that technologies must be given purpose in the context of education and not only as tools that need to be used. Instead of asking ourselves how to use a certain technology in the class, we should think about how this technology can help improve and enrich a certain learning experience.

Digital education has a key role in addressing this problem. By understanding how these technologies can best be used to support learning, digital education can help ensure that these technologies are used in a way which is in the best interest of learners. This includes the development of strategies and practices for the use of these technologies which are focused on the improvement of learning experiences and outcomes, and not on the use of technology itself.

Artificial intelligence (AI) is one of the most significant technologies to make a breakthrough in our time and has a potential to transform numerous aspects of our lives, including education. Therefore, it is of crucial importance that we not only talk about it but also actively explore and develop strategies for its effective use.

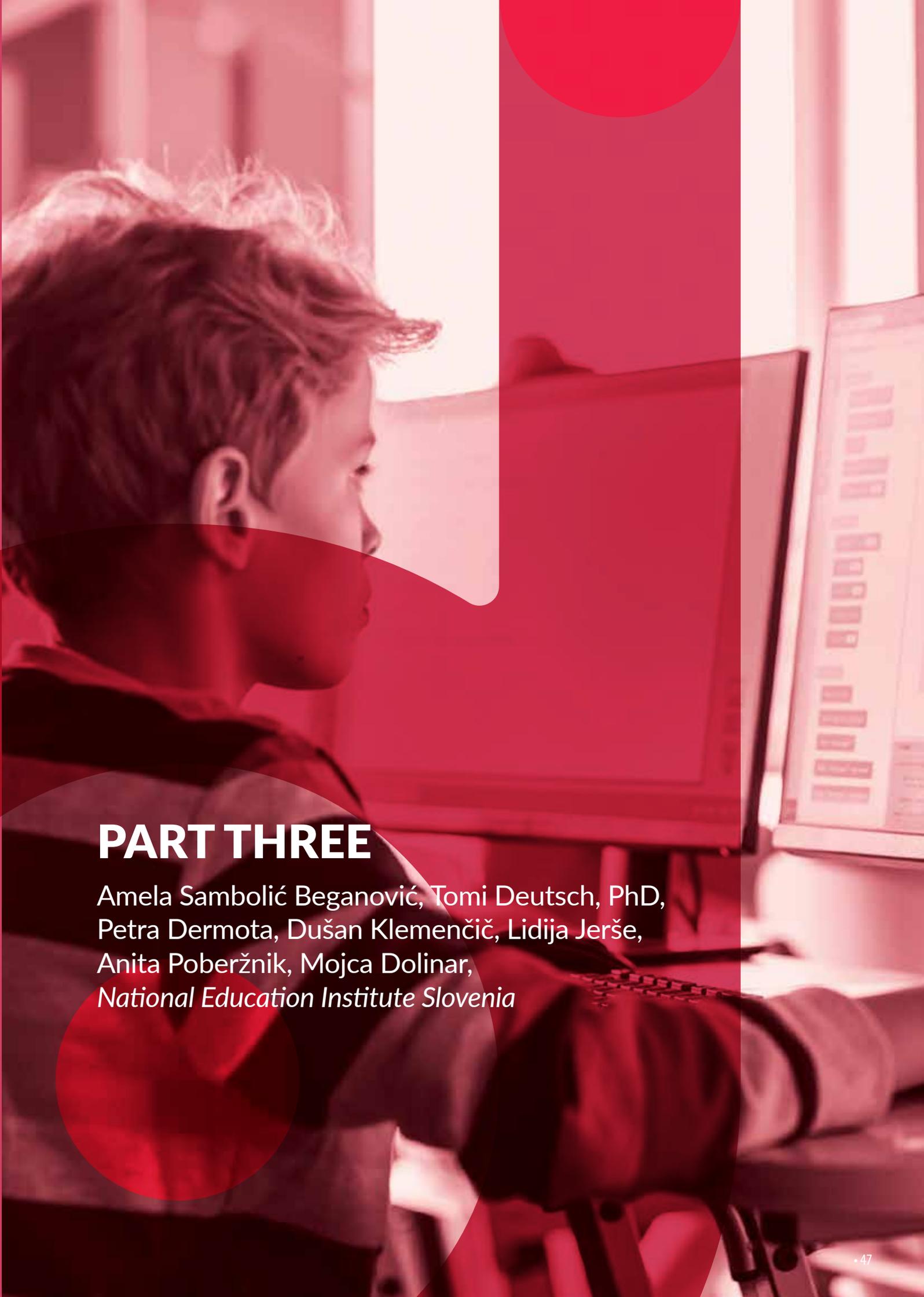
AI brings many opportunities to improve education. It can help personalise learning by adapting learning materials and activities to the individual needs and capabilities of learners. It can help in assessing and monitoring a learners' progress, enabling teachers to put greater focus on teaching. It can also help develop and provide an interactive and engaging learning experience which can increase the motivation and commitment of learners.

However, it is also important to be aware of the challenges that AI brings with it. This includes ethical issues such as data privacy and security, equitability and transparency of algorithms and the influence of AI on jobs and society as a whole. We must also think about how to ensure that AI is used in such a way that it supports human teachers as opposed to replacing them.

Conclusion

At a time when digital technology is modifying our world, digital education is crucial for the preparation of individuals for the future. This future will offer many new opportunities brought by technological advancement, but also challenges which will need to be overcome. Therefore, our vision of digital development is for every individual to have the best possible opportunities/conditions enabling them to develop and enhance their capabilities and competences in the changing digital world.

We believe that digital education can open doors to the world of knowledge and to opportunities that were previously unattainable. We believe that digital education can help shape a more equitable and inclusive society in which every individual has the chance to succeed. And we also believe that a digital education can help shape a better future for us all.



PART THREE

Amela Sambolić Beganović, Tomi Deutsch, PhD,
Petra Dermota, Dušan Klemenčič, Lidija Jerše,
Anita Poberžnik, Mojca Dolinar,
National Education Institute Slovenia

1 Why digital strategy? Recommendations for developers of digital strategies - Summary

The publication »Why Digital Strategy?« provides recommendations for developers of digital strategies, along with reflections about the role and importance of a digital strategy, findings about digital strategies in educational institutions participating in the Raising Digital Competence (DDK) project and examples of good practice for writing and upgrading digital strategies.

It is divided into several chapters whose main emphases are presented hereinafter.

Chapter 1: Digital technologies in class

Amela Sambolić Beganović

This chapter sets the foundation for understanding the role of digital technologies in education. The author initially defines the term digital technologies which is essential for any further discussion. She explores the ways in which the integration of digital technologies can improve educational processes. Through this chapter, she familiarises the readers with the basic concepts and benefits of digital technologies in education.

Key elements/areas for successful and diverse integration of digital technology:

1. Equipment with digital technology
2. Digital competence of teachers and learners
3. Compliance with curricula and the objectives of the subject
4. Needs and requirements of individuals (individualisation and personalisation)
5. Support and collaboration

Chapter 2: Using a digital strategy to carry out digital transformation of a school

Amela Sambolić Beganović, Petra Dermota, Dušan Klemenčič

This chapter's emphasis is on the role of digital strategies in the transformation of educational institutions. First, the concept and purpose of a digital strategy is defined. Further on, the authors provide starting points for the planning of digital strategies which is essential for their effective design and implementation.

A digital strategy is a strategic document addressing the challenges of digital transformation in educational institutions. It focuses on the development of digital didactics and the development and improvement of digital competence of teachers and learners. Every educational institution should have its own individualised digital strategy with clear goals and quantifiable indicators.

Based on the experience from the Raising Digital Competence project, a digital strategy is an indispensable strategic document of an educational institution for the area of raising digital competence or digital transformation at a school, which ensures a comprehensive approach in the integration of digital technologies into the educational process, the development of digital competence of teachers and learners and the development of digital didactics.

A digital strategy has a crucial role in giving a meaning to digital technologies and their planned positioning in the educational process. With thought-through and sensible use of digital technology, teachers stimulate innovativeness and improve the learning experiences of learners.

This chapter presents several examples of digital strategies from different countries and an outline of key activities related to the digitalisation of education in Slovenia. The chapter also includes several important strategic documents to support reflection on the development areas of digital strategies at individual educational institutions.

The authors present a template for planning a digital strategy and substantiate the selection of four development priorities in the digital strategy's implementation plan, for which a strategic team of an individual educational institution shall conduct an analysis of the situation, define goals and expected results, formulate quantifiable indicators and determine the required evidence of achieved targets. The template represents a useful framework enabling a structured and comprehensive approach to developing a digital strategy. It is intended to help and support all members of professional staff at educational institutions on the path towards digital transformation.

Template for the preparation of the Digital Strategy document

Description of elements/parts of the template

The template is intended for in-depth planning of digital strategies and guides the developers through four phases:

1. Analysis of the situation (an overview of the baseline situation in the field of digital competence, description of facts in the field of selected priorities and possible causes for the existing situation);
2. Selection of development priorities (identification of no more than two development priorities in an individual school year);
3. The drawing up of the implementation plan (planning the activities to achieve results within the determined deadlines; identification of those holding an activity/activities, the teachers and learners engaged and the expected results and indicators);
4. Identification of required support.

School year:
Educational institution:
Headmaster/Headmistress:
Head of school project team:
Team members:

1 Analysis of the situation:

1.1 An overview of the baseline situation in the field of digital competence, description of facts in the field of selected priorities and possible causes for the existing situation. A record of potential strengths and weaknesses (**summary of findings from the SELFIE self-assessment tool**)

	Strong areas	Weak areas
Management staff		
Teachers/educational staff		
Children/Pupils		

1.2 What is the situation in the field of digital competence at our school? Why do you think the situation is as described (possible causes)?

2 Selection of development priorities:

Selection of development priorities (identification of **no more than two development priorities** in an individual school year).

3 Implementation plan at educational institution/school level

Based on the established situation, plan the activities and improvements for the next/current school year

	Expected results <i>(What do we want to improve, what would we like to achieve ...?)</i>	Activities to achieve results and implementation deadline <i>(How will we achieve this and with which activities? What evidence will we gather? ...)</i>	Those holding an activity (a person or a team), others involved <i>(teacher and, learners who are actively involved – how many).</i>	Deadline for implementation of activities <i>(Until when? In which period?)</i>	Indicators (baseline and target, concrete and quantifiable ¹) <i>(How will we know we are on the right path?)</i>	Evidence of the achieved target indicator (at the end of a school year)
Digital didactics						
Digital competence of teachers						
Digital competence of learners						
Equipment with digital technology ¹						

4 Identification of support

Support needed for the plan to be implemented:

Miscellaneous: school rules, school vision

Chapter 3: Evaluation of digital strategies at educational institutions participating in the DDK project

Tomi Deutsch, PhD

Tomi Deutsch, PhD, focuses on evaluating digital strategies developed by those educational institutions participating in the DDK project. He describes the evaluation methodology, including the use of self-assessment (SELFIE). He presents the readers with the evaluation findings and offers an insight into the results and responses obtained using the SELFIE methodology. This chapter is of essential importance for understanding the effectiveness of digital strategies in practice.

Records for the following four priority areas were evaluated in digital strategies: digital didactics, the development of digital competence of educational staff, the development of digital competence of learners and equipment. For each priority area, records of expected results and activities as well as indicators and corresponding evidence were reviewed and evaluated. 217 digital strategies were evaluated, of which 147 for primary schools, 61 for secondary schools and 9 for other educational institutions.

Expected results and the planned activities to achieve these results were evaluated using a five-grade scale comprising the values of 1 - not present (not recorded or inadequate), 2 - basic implementation (basic use or development), 3 - well-considered implementation (purpose or goals recorded in respect of the planned activities), 4 - improvement of implementation and 5 - development-oriented implementation (innovative upgrade or development of the area). The methodology for the evaluation of expected results and activities was developed with the expectation that the majority of schools will achieve the values of either 2 or 3. It cannot be expected that values of 4 in a greater number of schools or 5 in a smaller number of schools will be achieved soon but rather have to be seen as something for the future.

In 49% of digital strategies, the expected results for the area of digital didactics were recorded at the basic level, 24% of the expected results were recorded at the level of well-considered implementation, while 'no expected results' were recorded in a quarter of the cases. For the area of digital competence development of educational staff, the share of 'digital strategies with no adequate records of expected results' is the lowest at only 13%, 'well-considered implementation' is recorded in 30% and 'basic implementation' in 56% of digital strategies. For the area of the digital competence development of learners, we established that in 48% of digital strategies, 'expected results' are recorded at the basic level, 31% at the level of 'well-considered implementation', while in one fifth of the cases there are no adequate records. A somewhat higher number of well-considered implementation was recorded for the first three priority areas in secondary schools.

In the field of equipment, the percentage of 'digital strategies without adequate record of expected results' is the highest, amounting to 37%, 'basic implementation' is recorded in 49% and well-considered implementation in only 14% of digital strategies. Relevant records are largely missing in secondary schools.

'Improvement of implementation' was recorded in the case of two digital strategies in the field of digital didactics, in case of three digital strategies in the field of development of digital competence of educational staff and in case of two strategies in the field of development of digital competence of learners. As expected, development-oriented implementation was not recorded in any of the digital strategies.

In addition to expected results and activities to achieve these results, the corresponding indicators and evidence were also evaluated for each of the four priority areas, which were used by educational institutions to evaluate their activities or to check whether the expected results were achieved. The indicators were evaluated using a four-grade scale comprising the values of 1 - not present (not recorded, unintelligible or inadequate), 2 - yes, modest (appropriate in terms of content but the indicators were estimated as too modest or insufficiently ambitious indicators), 3 - yes, appropriate (in terms of content and the indicators were estimated as realistic) and 4 - yes, unrealistic (appropriate in terms of content but the indicators were estimated as too ambitious or unrealistic).

Most of the recorded indicators were evaluated as 'appropriate' in terms of content but lacking in the area of 'not sufficiently ambitious'; In the field of digital didactics, indicators estimated as 'appropriate in terms of content and realistically achievable'; were recorded only in approximately 16% of digital strategies, approximately 14% of such indicators were recorded in the field of 'digital competence development of educational staff and learners', while approximately 7% were recorded in the field of 'equipment'. There was a rather high percentage of strategies with no indicators recorded – in the case of equipment where recording reached the lowest level, the percentage was as high as 60%.

The results for evaluation of digital strategies show that schools are the most confident in recording the digital competence development of educational staff, which is probably a consequence of a greater focus given to this field over a longer period of time. Schools are the least confident in recording the development in the field of equipment, which is probably a consequence of the influence of factors external to schools that decrease the autonomy of schools in this field. Based on evaluation results, we can conclude that digital strategies are necessary in order to give purpose to digitalisation. Furthermore, we can conclude that digitalisation still takes place at a more basic level and that there is a lack of 'well-considered development' in this area.

The results of the evaluation of digital strategies were additionally linked with the results of the self-assessment of schools through the SELFIE application. It turned out in a considerable number of cases that primarily management, but also educational staff, at schools whose digital strategies were assessed as 'inappropriate in terms of content', evaluated their work with the highest grades. On the other hand, the highest grades using the SELFIE application were provided by learners of schools which recorded in their digital strategies that 'implementation in specific areas was well-considered'. Based on these results, we can conclude that the level of self-criticism of management, as well as educational staff, at schools that were not very successful in drawing-up their digital strategies was somewhat too low.

Chapter 4: Recommendations and examples as support in preparation of digital strategies

Amela Sambolić Beganović, Tomi Deutsch, PhD, Petra Dermota, Dušan Klemenčič, Lidija Jerše

In this chapter, the authors provide valuable recommendations and four examples to help develop digital strategies. Individual examples focus only on one development priority of the implementation plan (digital didactics, development of digital competence of educational staff, development of digital competence of learners along the vertical axes and equipment with digital technology), highlighting individual educational periods (pre-school education, primary school (first, second and third educational periods) and secondary school).

Examples and recommendations are based on the analysis of records from the digital strategy development plan in which members of development teams from educational institutions participating in the DDK project (Raising Digital Competence) specified goals and expected results, planned key activities focusing on the process/development (e.g. what will educational institutions do and how they will do it and how to include the remaining co-workers etc.), defined baseline, target, concrete and quantifiable indicators and foresaw evidence of achieving the targets.

Examples of developing and raising digital competence:

- Example of developing and raising digital competence of children and pupils (pre-school education and first educational period of primary school);
- Example of developing and raising digital competence of teachers (second educational period of primary school);
- Example of equipment with digital technology (secondary school);
- Example of digital didactics for pre-school education.

Chapter 5: Digital strategy shall act as a trigger of change

Amela Sambolić Beganović, Tomi Deutsch, PhD, Petra Dermota, Dušan Klemenčič, Lidija Jerše

The final chapter emphasises the key message of the publication: digital strategy shall act as a trigger of change. The authors encourage reflection on how a digital strategy stimulates a positive change in educational institutions and education in general. This chapter and the entire publication is concluded with the »PYRAMID« poster. It is a visual representation of key elements of a digital strategy (DS), which summarises DS elements in one place, defines the support needed for developers of digital strategies, raises awareness about the levels of implementation of individual development priorities and the levels of advancement for teachers and learners. The poster displays 10 recommendations that guide the developers towards effective and sensible planning and implementation of DS, enabling transparent presentation of key concepts with its structure, colouration and symbolic display.

We are convinced that the publication will be a useful resource for everybody involved in digital education. The document offers a definition of some fundamental concepts, defines support, brings evaluation while providing practical examples and recommendations for upgrading the existing practices of developing and implementing digital strategies adapted to specific needs and goals of particular institutions.

Digital strategy (DS)

Elements of DS:

1. Analysis
2. Selection of development priorities
3. Implementation plan
4. Identifying support

Development priorities of DS:

Digital didactics
Raising the digital competence of teachers (RDC of teachers)
Digital competence of learners (EDC of learners)
Equipment with digital technology

Support to DS planning:

SELFIE school
SELFIE teacher
DigCompEdu
DigComp 2.2
SAMR model
Pedagogical wheel
Didactic principles
Guidelines for using digital technology
7 principles of learning

Levels of DS implementation:

Basic implementation
Thoughtful implementation
Improved implementation
Development-oriented implementation

Proficiency levels of learners:

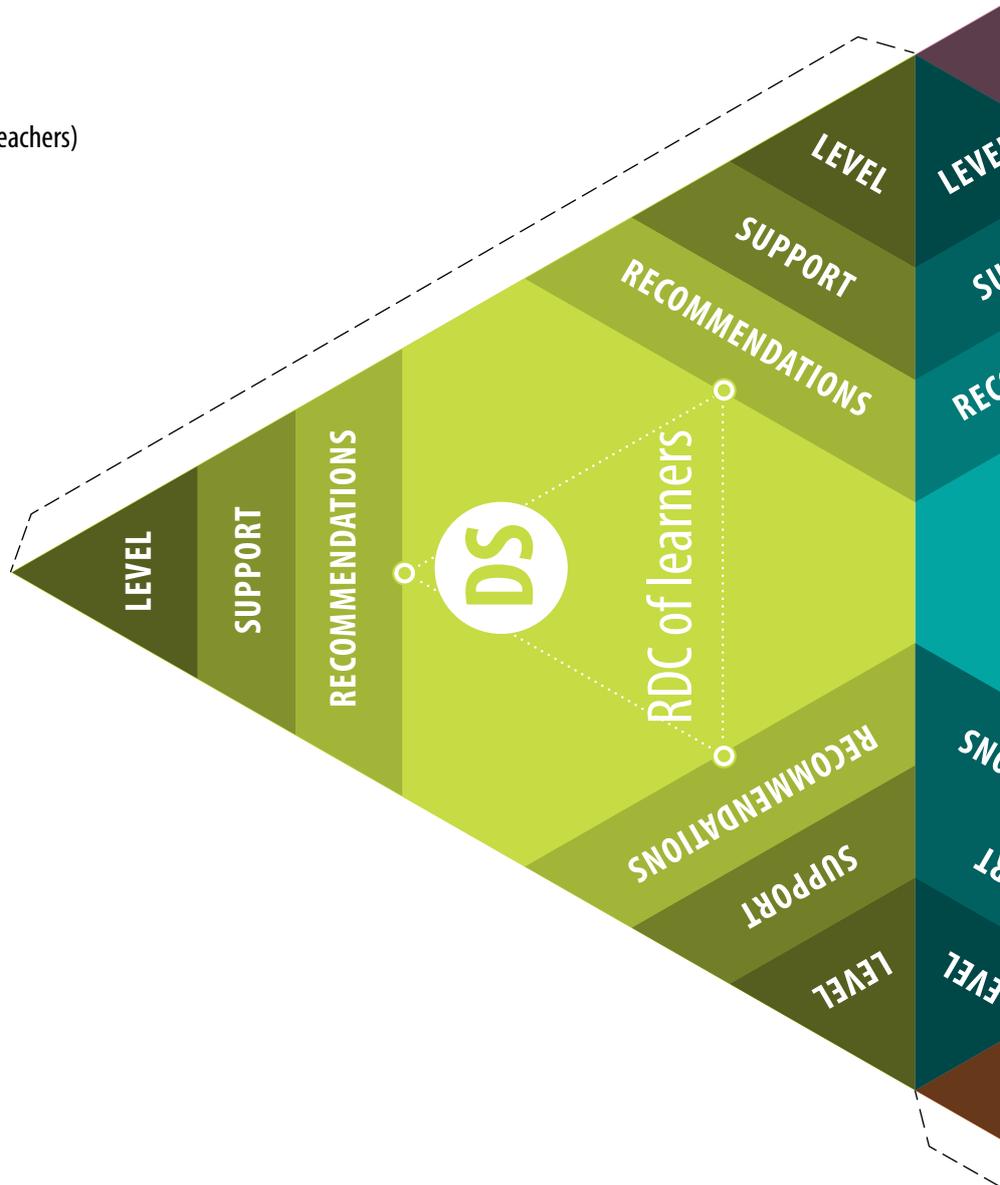
Foundation
Intermediate
Advanced
Highly specialised

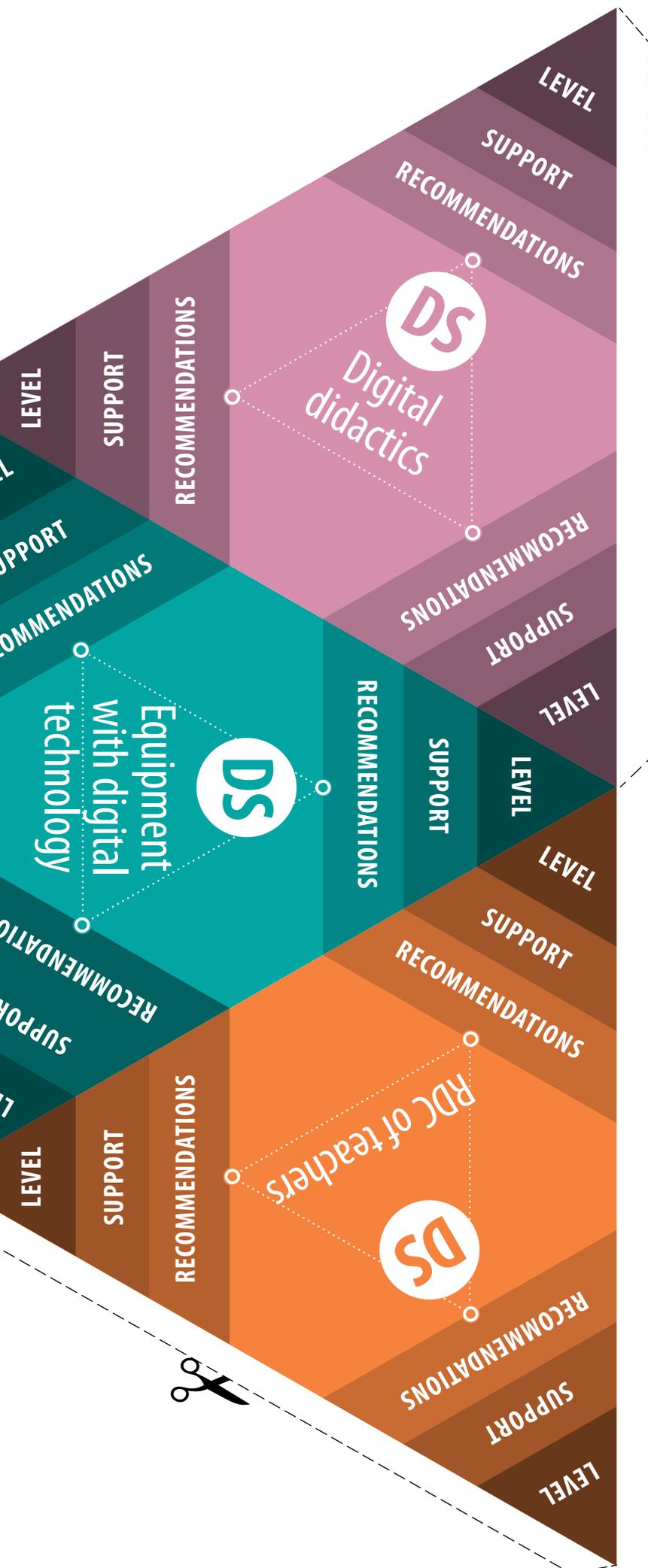
● DigComp 2.2

Proficiency levels of Teachers:

A1 Newcomer
A2 Explorer
B1 Integrator
B2 Expert
C1 Leader
C2 Pioneer

● DigCompEdu / SELFIE





Recommendations for DS planning

1. Digital technology stimulates innovativeness and improves the learning results of learners. The use of digital technology shall be guided by didactic principles, the 7 principles of learning and the SAMR model.
2. Successful inclusion of digital technology requires the proper equipment and digital competence of teachers and learners. The use of Digcomp 2.2 and DigCompEdu frameworks for self-assessment, education and training helps teachers and learners understand and develop their digital competence and monitor their progress on a regular basis.
3. Greater use of digital technologies in education does not necessarily mean an increased level of digital competence and development of digital didactics. It is not self-evident that the increased amount of time spent on using digital technologies in education and for the purposes of education does not necessarily mean the development and improvement as regards the use of digital technologies.
4. The effective introduction of digital technology into education requires a digital strategy with a long term vision with clearly stated, concrete, realistic and verifiable goals, objectives and outcomes.
5. A digital strategy must be adapted to the needs, goals and capabilities of individual educational institutions. It is important that all stakeholders, i.e. teachers, learners, management and other educational staff of educational institutions, are involved in its development.
6. A digital strategy shall include development priorities (not more than two per school year), which shall be monitored very closely for each given school year in accordance with a detailed implementation plan.
7. A digital strategy is a "living" document, subjected to continuous change – upgrading from year to year as well as amending and altering within every school year. Its regular upgrading is important for ensuring its effectiveness.
8. Secondary school residence halls, music schools and schools/institutions for children with special needs require a particular approach to digitalisation, therefore it is important to identify and address development priorities that will enable successful integration of digital technologies in their environments/fields of work.
9. The expected outcomes of a digital strategy shall be directed toward the improvement of educational practices through the sensible use of digital technologies and not only to the potential improvement of results obtained by self-assessment tools, e.g. the SELFIE tool (intended to improve not only grades, but knowledge as well). The SELFIE self-assessment tool helps teachers and educational institutions assess their use of digital technologies and define those areas where improvement is needed.
10. Less is more!

2 Facilitating learners' digital competence – Expert background and recommendations – Summary

Anita Poberžnik and Mojca Dolinar, National Education Institute Slovenia

Recognising the needs of educational and management staff of educational institutions in the field of digital pedagogics, the authors of the handbook, *Facilitating Learners' Digital Competence*, prepared expert guidelines for the planning, implementation and evaluation of modern educational processes at pre-school, primary and secondary school levels.

The use of digital technology in a learning process follows the learning purpose of the curriculum and modern approaches to pedagogical work with children as well as primary and secondary school pupils. It shall be critical, responsible and creative, promoting education aimed at developing responsible and proactive digital citizens who will be able to (virtually) act and collaborate. Modern educational institutions develop good practices in the field of digital citizenship, share them within their facilities as well as with their closer and wider environment and contribute to the creation of a better, inclusive society by their example and action. Children and pupils, as digital citizens, need to be taught how to create a good online identity, how to look after their health and protect the environment and how to co-create a better and equitable (virtual) society (Dolinar, 2021). The area of digital citizenship is covered in the chapter describing approaches and methods in teaching practice.

In searching for answers to the question of what is truly good for teaching children, we can say with certainty that the best approaches have something in common: they open up rich worlds where children can develop their own exploration strategies and interests and diversify their knowledge and skills. A diverse and rich world will spark the curiosity in each of us and stimulate us to further explore the world, be it real or virtual. Such are the learning situations we would like to provide to our learners in educational institutions while we develop digital knowledge.

In the handbook we present a systematic approach of educators and teachers when developing a safe and stimulating learning environment in which they foster the development of learners and prepare them to assume responsibility for a safe and responsible use of digital technology while they also develop a positive attitude in various learning situations. In the field of pre-school education, educators - with their professionalism, knowledge and, above all, by their own example - safely introduce children into the world of responsible use of digital technology. Also, it is very important that kindergartens permanently maintain a high level of cooperation with parents, particularly in recognising the signs of children's (un)safe use of digital technology. Kindergartens also have an important compensatory role for children coming from less stimulative environments, thus enabling that the equal opportunities principle is followed (Jerše, 2012). In school, systematic development continues with a learning process focused on learners who monitor and regulate their learning, who know what they want to achieve and how to regulate their learning path and where to find help should they need it. In addition, learning has to enable the acquisition of social experience and socialisation with peers where learners are given the opportunity to assume responsibility for themselves, their knowledge and collaborative work. Learning must also enable the awareness of feelings, directing pupils to develop positive emotions, the sense of success and the energy needed to accomplish goals (OECD 2013). The learning process is based on prior knowledge and cognitive abilities, knowledge of one's strengths, interests, challenges and the development of learning strategies which support learners. The use of digital technology shall serve as a support in mastering demanding content and innovative creation; therefore, in the course of planning, we also take into consideration which approaches can be enabled by digital technology, whereby we avoid introducing the unsubstantiated use of digital technology or adapting the learning process to a selected digital technology (Poberžnik et al., 2022). Innovative educators and teachers are therefore needed to create a modern learning environment, along with an innovative school culture in which, we believe, we

can improve our knowledge and teaching skills (William, 2013).

The annex to the handbook, *Facilitating Learner's Digital Competence*, includes a concept map, *The Use of Digital Technologies in the Learning Process*, and *Recommendations For Achieving Proficiency Levels Of Children/Pupils as They Develop Their Digital Competence*.

In the concept map, *The Use of Digital Technologies in the Learning Process*, learning with the use of digital resources, visualisation, active methods and forms of learning, formative assessment and research and development work are shown.

Recommendations For Achieving Proficiency Levels Of Children/Pupils as They Develop Their Digital Competence cover the development taking place in the field of information and data literacy, communication and collaboration, creation of digital content, security and problem solving. The systematic development of children's digital competence begins as soon as they come into contact with digital technologies. At pre-school level and in the first educational period of primary school, the development takes place at the basic level, i.e. first and second levels according to DigComp 2.2. In the second educational period, it takes place at the medium, i.e. third levels according to DigComp 2.2. In the third educational period, the development takes place at the medium, i.e. fourth level according to DigComp 2.2, while in secondary school, it takes place at the fifth and sixth levels according to DigComp 2.2. The specified levels are indicative and, in certain areas, a learning group can be followed with work at higher levels if a learning group shows a higher proficiency level in the field of digital competence.

You are kindly invited to read this handbook with annexes and examples of good practice provided by developmental educators and teachers. We hope you will be able to test these examples safely in your own practice!

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RECOMMENDATIONS FOR ACHIEVING PROFICIENCY LEVELS OF CHILDREN/PUPILS AS THEY DEVELOP THEIR DIGITAL COMPETENCE

	<p>Information and data literacy refers to the knowledge, skills and attitudes involved in developing the ability to acquire, evaluate, store, retrieve and manage data and information.</p>	<p>Communication and collaboration refers to the knowledge, skills and attitudes involved in developing the ability to communicate and collaborate through interaction while using digital technologies to share and co-create information and content, to respect copyright law, to encourage proactive citizens to practice netiquette, maintain their reputation and manage their digital identity.</p>	<p>Creating digital content refers to the knowledge, skills and attitudes involved in developing the ability to develop digital content, upgrade the existing content, understand and observe copyright and licensing rules and engage in programming.</p>	<p>Security refers to the knowledge, skills and attitudes involved in developing the ability to protect devices, digital data, personal data and privacy as well as to look after one's health and wellbeing.</p>	<p>Problem solving refers to the knowledge, skills and attitudes involved in developing the ability to solve technical problems, provide technological responses, use digital technology creatively and maintain awareness of digital competence development.</p>
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RECOMMENDATIONS FOR ACHIEVING CHILDREN'S DIGITAL COMPETENCE PROFICIENCY LEVELS IN PRE-SCHOOL EDUCATION

The development of children's digital competence begins as soon as they come into contact with digital technology. In the field of pre-school education, the development of digital competence begins at the basic, first and second levels according to DigCimp 2.2 (Vuorikari et al., 2022), as children perform simple tasks using digital technology in concrete situations through imitation, with the guidance of educators or even independently if a digital device is not connected to the internet.

The definition is indicative and individual learning groups can be followed by working at a higher level in certain fields if they show a higher level of proficiency in achieving digital competence (Handbook: Facilitating learners' digital competence - Expert background and recommendations, NEIS, 2023)

<p>In the field of INFORMATION AND COMMUNICATION literacy, children in specific situations (e.g. before a trip) recognise the need to find the desired data, information or digital content in digital environments. With simple searching, children can find, for example, data on the weather, location and landmarks etc. with the guidance of educators.</p>	<p>In the field of COMMUNICATION AND COLLABORATION, children in specific circumstances (communication with a child who has been absent for a longer period of time or connecting with a group of children from a distant kindergarten etc.) recognise simple digital means of communication and collaborative digital tools and use them together with educators. In the process, educators teach children how to recognise digital identity, how to maintain their reputation, which personal data to protect and how to communicate respectfully.</p>	<p>In the field of CREATING DIGITAL CONTENT, children can recognise and use simple ways to create digital content in various formats in order to express themselves creatively. By altering the existing digital content, children can create new content according to their own ideas. By doing so, children can learn simple rules of citing authors and sources as well as using licences. Children also become familiar with the use of simple commands and can use these to perform tasks on the computer.</p>	<p>In the field of SECURITY, children gradually recognise the impact of digital technology on humans and the environment. They also learn how to handle digital devices safely in digital environments. They learn which personal data need to be protected, how to recognise risks and how to act in unpleasant situations, whom to turn to for help and protection, and how to protect their privacy, their reputation and the reputation of others. While using digital technology, they can look after their health and wellbeing. They can also learn how to handle digital technologies properly in order to protect the environment.</p>	<p>In the field of PROBLEM SOLVING, children can recognise simple technical problems, familiarise themselves with simple digital tools and find simple solutions. They become familiar with simple ways of adjusting the digital environment according to their needs and purposes. They become familiar with simple digital tools and digital environments for creating, altering or improving the existing things they use on their own or in a group with the guidance of educators. They observe and recognise where and how they can make improvements in the digital field. They are included in the creation, assessment and self-assessment of proofs in the development process and learning (video recordings, photographs, audio recordings and their e-portfolios etc.).</p>
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RECOMMENDATIONS FOR ACHIEVING PUPILS' DIGITAL COMPETENCE PROFICIENCY LEVELS IN THE FIRST AND SECOND EDUCATIONAL PERIOD OF PRIMARY SCHOOL

A child's first steps in the development of digital competence are made in contact with digital technology already before entering primary school. **In the first educational period of primary school**, the planned development of digital competence continues at the basic, first and second level according to DigComp 2.2 (Vuorikari et al., 2022), as children already perform simple tasks using digital technology in concrete situations through imitation, with the guidance of others, educators, teachers or even independently.

The definition is indicative and individual learning groups can be followed by working at a higher level in certain fields if they show a higher level of proficiency in achieving digital competence (Handbook: Facilitating learners' digital competence - Expert background and recommendations, NEIS, 2023)

<p>In the field of INFORMATION AND COMMUNICATION LITERACY, pupils can recognise the need to find the desired data, information or digital content in digital environments. They can find them with simple searching and they can describe the path taken in their search. In the mean time, they learn how to access the data again, as well as information or digital content that was accessed previously. While searching, they learn to recognise the credibility and reliability of everyday sources of data, information and digital content. They can save any information found previously for further use and simply organise it in folders or another simple environment.</p>	<p>In the field of COMMUNICATION AND COLLABORATION, pupils in given circumstances can recognise and use simple digital means of communication and collaborative digital tools and share data or information. Meanwhile, they become familiar with simple ways of citing authors and/or sources. With guidance and by using digital technologies, they recognise how they can participate in their environment with their initiatives as citizens. As they participate in digital environments, they can recognise digital identity, describe how to maintain their reputation, which personal data they need to, how to recognise their digital trace and how to interact with other participants respectfully.</p>	<p>In the field of CREATING DIGITAL CONTENT, pupils can recognise and use simple means to create digital content in various formats in order to express themselves creatively. By altering existing digital content, pupils can create new content according to their own ideas. By doing so, they learn simple rules related to the citation of authors and sources and the use of licences. They become familiar with the use of simple commands and can use these to perform simple tasks on the computer.</p>	<p>In the field of SECURITY, children can recognise the impact of digital technology on humans and the environment. They also learn how to handle digital devices safely in digital environments. They learn which personal data need to be protected, which data they can share with others in digital environments, how to recognise risks and how to act in unpleasant situations, whom to turn to for help and protection, how to protect their digital identity, their privacy, reputation and the reputation of others. For social inclusion, they can use simple digital technologies. While using digital technologies, they can look after their health and wellbeing. They can also recognise how to use digital technologies properly in order to protect the environment.</p>	<p>In the field of PROBLEM SOLVING, pupils can recognise simple technical problems, they become familiar with simple digital tools and they can search for simple solutions. They become familiar with, and use, simple ways of adjusting their digital environment according to their needs and purposes. They become familiar with simple digital tools and digital environments for creating, altering and improving things that exist and use them on their own or within a group. They observe and recognise where and how they can make improvements in the digital field.</p>
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RECOMMENDATIONS FOR ACHIEVING PUPILS' DIGITAL COMPETENCE PROFICIENCY LEVELS IN THE SECOND EDUCATIONAL PERIOD OF PRIMARY SCHOOL

In the **second educational period of primary school**, children develop digital competence at the medium, third level according to DigComp 2.2 (Vuorikari *id.*, 2022) as they use digital technologies while independently performing simple tasks and solving simple problems.

The definition of the level achieved is indicative and depends on the learning group and individuals within the group and their digital competence proficiency level.

<p>In the field of INFORMATION AND COMMUNICATION LITERACY, pupils can describe what they find in digital environments and why. While performing a simple search of data, information or digital content, they can explain how they found them, how to access them and navigate between them. They can evaluate the sources used as well as the data, information or digital content found. They can also save and organise them in a simple way and in a structured environment with the ability to retrieve them again as required.</p>	<p>In the field of COMMUNICATION AND COLLABORATION, pupils can use common ways of interaction in order to communicate and collaborate. While engaging in communication and collaboration, they are able to behave respectfully and culturally in various social situations. They can use the means of communication, digital tools or digital environments appropriate for the situation. They can use common digital technologies for sharing data, information or digital content. In doing so, they observe ethical conduct and use common ways of citing authors and sources. For proactive citizenship, they use the services available for this purpose. They maintain their reputation and reputation of others, they can protect their digital identity and they can manage their digital trace.</p>	<p>In the field of CREATING DIGITAL CONTENT, pupils can create various digital content in common formats usual for documents, photographs, video recordings, etc. Using digital tools, they can alter the digital content already created by including new ideas while citing sources and authors in the usual manner and using licences ethically. They can use and explain common commands for solving simple problems related to a computer system.</p>	<p>In the field of SECURITY, pupils are becoming familiar with the impact of digital technology on humans and the environment. They know how to handle digital devices safely in digital environments. By acting properly in digital environments, they protect their personal data and they are familiar with simple privacy statements in which they agree with the use of personal data in the digital environment. They can share data ethically and protect their own privacy and the privacy of others as well as their digital identity and reputation. While using digital technology, they can look after their health and wellbeing. They also know how to protect the environment by handling digital technologies properly.</p>	<p>In the field of PROBLEM SOLVING, pupils can recognise common technical problems and eliminate them by addressing them in the usual way. They can use common ways of adjusting their digital environment according to their needs and purposes. They can use common digital tools and digital environments to create, alter and improve the existing things they use on their own or within a group. They can monitor their own development in the digital field and improve it.</p>
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RECOMMENDATIONS FOR ACHIEVING PUPILS' DIGITAL COMPETENCE PROFICIENCY LEVELS IN THE THIRD EDUCATIONAL PERIOD OF PRIMARY SCHOOL

In the **third educational period of primary school**, pupils develop digital competence at the medium, fourth level according to DigComp 2.2 (Vuorikari et al., 2022) as they independently use digital technologies while performing new tasks and solving new problems.

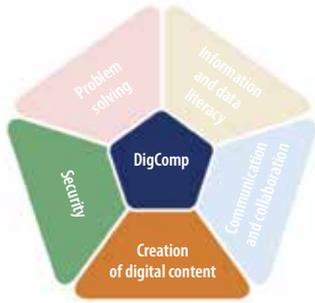
<p>In the field of INFORMATION AND DATA LITERACY, pupils can explain what they search for in digital environments and why. They can find data, information or digital content through simple searching in digital environments, they can explain how to access them and navigate between them and they can explain their search strategy. They can analyse sources, data, information or digital content, compare and assess them from the perspective of credibility and applicability. They can organise the results of their searches and save them in a structured environment for further use.</p>	<p>In the field of COMMUNICATION AND COLLABORATION, pupils can select various means of communication, digital tools and digital environments for interaction in the society according to their needs. While doing so, they behave respectfully and culturally in communication and collaboration in various social situations. In sharing sources, data, information or digital content, they can select the most appropriate digital technologies, having regard to ethical conduct and using conventional methods of citing sources and authors. For practicing proactive citizenship, they learn how to use proper digital services. They can maintain their own reputation and reputation of others, they can protect their digital identity, they can distinguish digital identities and manage their own digital trace which they create using various digital tools and digital environments.</p>	<p>In the field of CREATING DIGITAL CONTENT, pupils ethically create and edit digital content in various formats while citing sources and authors properly and practise the proper use of licences. They can alter the digital content already created by using fresh ideas, proper digital tools and proper digital environments, which they discuss with others. They can use commands to solve a given or specific problem related to a computer system.</p>	<p>In the field of SECURITY, pupils are becoming familiar with the impact of digital technology on humans and the environment. They can handle digital devices safely, also in digital environments, and can properly select the manner of protecting their devices and digital content. They can protect personal data and privacy by appropriate conduct in digital environments, they are familiar with privacy statements on the use of collected personal data. They discuss the issues of protecting health and the environmental with others. While using digital technology, they can look after their health and wellbeing. They protect the environment by properly handling digital technologies.</p>	<p>In the field of PROBLEM SOLVING, pupils can distinguish various technical problems and find solutions to eliminate them. They can explain their selection of digital tools and digital environments and they can adjust them according to their needs and purposes. In order to create, alter or improve the things that already exist, they can select the most appropriate means from among the existing digital tools and digital environments. They can solve complex problems in digital environments individually or within a group.</p>
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RECOMMENDATIONS FOR ACHIEVING DIGITAL COMPETENCE PROFICIENCY LEVELS OF PUPILS IN SECONDARY SCHOOL

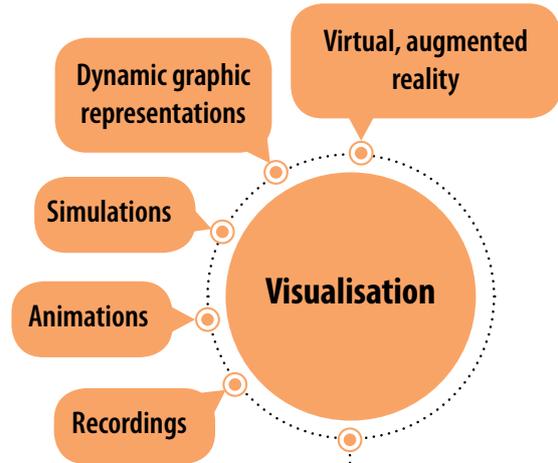
In **secondary school**, pupils develop their digital competence at high, fifth or sixth levels according to DigComp 2.2 (Vuorikari idr., 2022) as they independently use and assess digital technologies for solving complex problems while also helping others.

<p>In the field of INFORMATION AND DATA LITERACY, pupils can estimate what to search for in digital environments and explain why. They can search for data, information or digital content in digital environments and they can explain how to access them and navigate between them and they can also modify their searching strategy as required. They can critically assess the credibility and reliability of sources, data, information or digital content and organise and save them in such a way they can retrieve and save them in a structured environment as easily as possible.</p>	<p>In the field of COMMUNICATION AND COLLABORATION, pupils can select and adjust appropriate digital means of communication, digital tools and digital environments for social interaction. By doing so, they behave respectfully and culturally when communicating and collaborating in various social situations. As they create and share sources, data, information or digital content, they can select and adjust the most appropriate digital technologies. By doing so, they can take into account their ethical conduct and they can use the appropriate manner of citing sources and authors. In order to engage in proactive citizenship, they can use the relevant digital services. They can maintain their own reputation as well as the reputation of others, they can protect their digital identity, they can distinguish various digital identities and manage their own digital trace which they create by using various digital tools and digital environments.</p>	<p>In the field of CREATING DIGITAL CONTENT, pupils can ethically create and edit digital content in the most suitable format, cite sources and authors properly and use licences correctly. They can alter the digital content already created adequately when using new ideas, the correct digital tools and proper digital environments. They can use commands for solving a given or specific problems related to a computer system.</p>	<p>In the field of SECURITY, pupils are becoming familiar with the impact of digital technologies on humans and the environment. They can handle digital devices in digital environments safely and they can select the proper methods for protecting their devices and digital content. Through responsible behaviour in digital environments, pupils can protect their personal data and privacy and they can use privacy statements properly on using personal data. While using digital technology, they can look after their health and wellbeing. They protect the environment by handling digital technologies responsibly.</p>	<p>In the field of PROBLEM SOLVING, pupils can recognise the seriousness of technical problems and come up with proper solutions to eliminate them. They can select the most relevant digital tools or digital environments and adjust them in order to create, alter or improve the existing things. They can solve complex problems in digital environments individually or within a group. They can assess their digital competence and plan their own development.</p>
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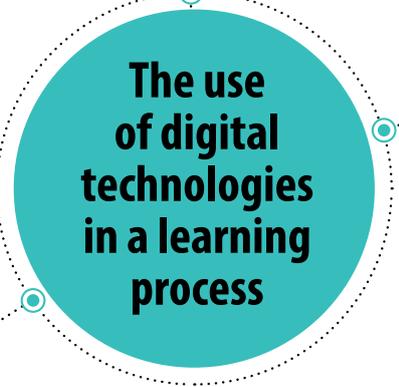
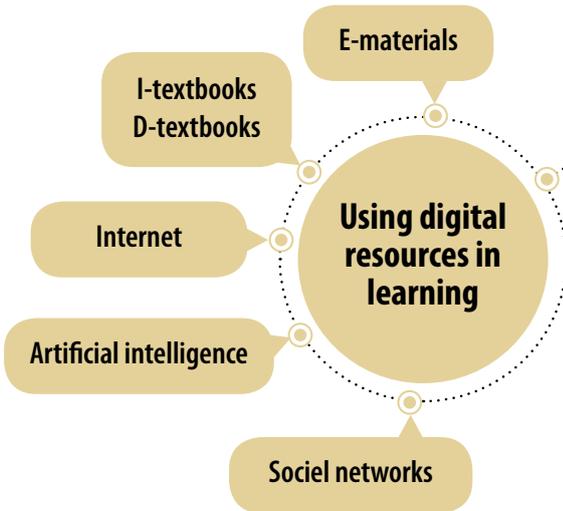
The use of digital technologies in the learning process



- Multimedia
- Dynamism
- Interactivity
- Development of spatial perceptions
- Flipped learning
- Creation



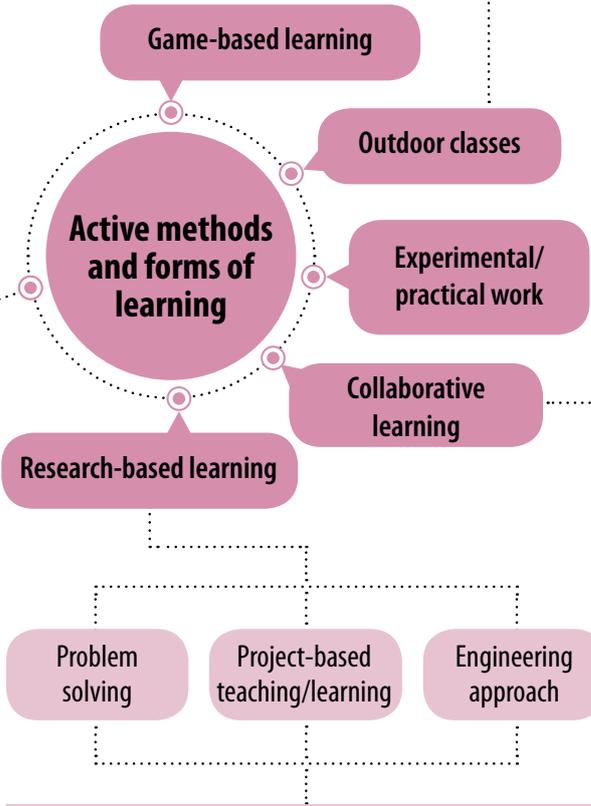
- Interactivity
- Multimedia
- Individualisation
- Personalisation
- Reading learning strategies
- Digital reading



- FORMATIVE ASSESSMENT**
- LMS systems (virtual connections, exchange of materials, feedback, peer-to-peer collaboration, reflection, providing feedback)
 - Co-creation of the learning purpose, success criteria, learning activities (billboards, mind mapping, joint documents)
 - Provision of personalised feedback
 - Peer-to-peer assessment
 - Reflection and evaluation

- Possibility to choose
- Time limitation
- Scales, points
- Challenges
- Collaboration
- Role playing
- Avatars
- Rewards
- Creation of didactic games

- Interactive learning paths
- Documenting
- Observing
- Photographing
- Recording



- Recordings of experiments/processes
- experimental work (sensors, interfaces)
- Virtual laboratory
- Remote laboratory
- 3D printers

- Interactive LMS systems (virtual connecting information exchange, peer collaboration, reflections)
- Social media (communication)
- Conference systems
- Joint documents for co-creation, providing feedback
- Online collaborative projects

INSIGHT INTO A PROBLEM
(Tools for creating mind maps, billboards, blogs, photographs, recording, scanning)

PLANNING
(tools for editing joint documents)

IMPLEMENTATION, ENQUIRIES, IMPROVEMENTS
(data sets, collaboration tools, social networks, computer-supported laboratory, video-conference systems, online surveys, exchange and collaboration tools)

PRESENTATION

- Direct (Prezi, Powerpoint, Slideshare, etc ...)
- Interactive checking whether a presented (solution) problem/task was understood (Google forms, Arnes planer, AKF quiz, Sokrative Quiz, Kliker, Nearpod, ...)
- Online presentation
- Didactic (virtual and physical) games
- Products (folders, posters, videos, animations, 3D printer-generated products)



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