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Kazalo / Table of Contents

Prispevki / Articles

THE SOCIAL, COGNITIVE AND SOCIO-DEMOGRAPHIC PROFILE OF POTENTIALLY GIFTED CHILDREN

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Abstract/Izvleček
The research results suggest that teachers find potentially gifted children to be academically more competent and sociable as opposed to students without the same potential. Likewise, potentially gifted children tend to have better academic achievements. When it comes to their socio-demographic profile, there seem to be more female students than male, and they often live in urban areas. Additionally, both parents of potentially gifted children show higher levels of education when compared to parents of non-potentially gifted children. The results of the hierarchical regression analysis point to significant effects by gender, place of residence and parental education have in explaining children's academic competence and sociability; results also reveal significant incremental validity in the assessment of cognitive ability, motivation, and creativity.

Socialni, kognitivni in sociodemografski profil potencialno nadarjenih otrok
Rezultati raziskave kažejo, da učitelji potencialno nadarjene učence ocenjujejo kot bolj učno kompetentne in družabne v primerjavi z učenci, ki to niso. Prav tako imajo potencialno nadarjeni učenci boljši šolski uspeh. Glede njihovega sociodemografskega profila se zdi, da je učenk več kot učencev in da pogosteje živijo v večjih urbanih območjih. Prav tako imata oba od staršev potencialno nadarjenih otrok višjo stopnjo izobrazbe kot starši otrok, ki niso prepoznani kot potencialno nadarjeni. Rezultati stopenjske regresijske analize kažejo na pomemben prispevek spola, kraja bivanja in izobrazbe staršev pri razlagi učne kompetence in družabnosti otrok, medtem ko naj bi imele ocene kognitivnih sposobnosti, motivacije in ustvarjalnosti pomembno inkrementalno veljavnost.

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Giftedness signifies the possession and use of unlearned and spontaneously expressed abilities in at least one ability domain, whilst implying that the individual in question is at least in the top 10% among his peers (Gagné, 2004). The term presupposes relatively high intellectual capacity and an advanced level of at least one of the following capabilities: general intelligence, creativity, socioemotional ability and/or sensorimotor ability (França-Freitas, Prette and Prette, 2014).

Renzulli's three-ring model of giftedness (Renzulli, 2005) represents an applicable model in the school environment. This model often forms the basis for the development of assessment scales intended for teachers and parents who seek to identify gifted students. The three-ring model assumes that giftedness comprises of three characteristics: ability, motivation/task orientation and creativity. It is only when these three characteristics combine that we can consider giftedness. Abilities imply above average general intellectual abilities and/or specific abilities, which are measured with an intellectual ability test. Motivation does not primarily belong to the intellectual domain; it implies commitment to a task, perseverance, dedication, positive energy and an especially strong motivation in solving a problem. Creativity refers to curiosity, originality, ingenuity, fluency, flexibility, curiosity, as well as solving problems in a new, different way.

When it comes to gifted children and their characteristics, the literature thus far has been mostly saturated with research referring to their intellectual abilities, while the studies dealing with their social and emotional characteristics, as well as their adjustment, are relatively scarce and of recent date.

It is clear that high intellectual abilities separate the gifted from the non-gifted. Indirectly, we could conclude that high intellectual capacities contribute to academic success, although some research indicates that gifted students do not always prove to be the most academically successful ones, and that academically successful students need not always be extremely gifted (Parekh, Brown and Robson, 2018). However, in gifted children there tends to be a discrepancy in developmental aspects relating to outstanding intellectual abilities that surpass the intellectual abilities of their peers, while the emotional and social development is at the same level. Authors have different names for this "discrepancy" in development, such as "dyssynchrony" (Terrassier, 1985) or "asynchrony". Inconsistency in terms of developmental aspects results in internal and social gap (Shechtman and Silektor, 2010). This discrepancy can cause problems with child's emotional and social adjustment.

M. Klarin, S. Šimić Šašić & A. Proroković: *The Social, Cognitive and Socio-Demograhic Profile of Potentially Gifted Children*

359

The same discrepancy is also at the root of specific emotional and social needs of gifted children, which makes them different from non-gifted ones. This in turn indicates that gifted children belong to an emotionally and socially sensitive group. It is safe to assume that gifted children feel "different" and have different emotional and social needs that affect their social relationships (Bain and Bell, 2004).

The most common specificities connected with giftedness, apart from those pertaining to intellect, are excitability, sensitivity, persistence and self-determination (Lovecky, 1992). These specificities lead to increased awareness of one's own emotions (Cross, 2002). Thus far, the results pertaining to this field of research pointed to strength, but also to sensitivity of gifted people; in other words, giftedness can be both positive and negative at the same time (Peterson, 2009). This is why we come across opposite conclusions in literature. On one hand, the research results suggest that gifted students tend to have more developed social skills (França-Freitas, Prette, Prette, 2014), more developed self-regulation and self-efficacy (Guez, Peyre, Le Cam, Gauvrit and Ramus, 2018), more positive self-esteem (Amini, 2005; Bain and Bell, 2004), more positive academic self-image and more developed empathy (Shechtman i Silektor, 2010). By comparing social aspects of gifted students' self-image and of students with high academic achievements, Bain and Bell (2004) concluded that gifted children achieved higher results on the assessment scale of physical abilities, physical appearance and generally had a more positive self-image, whereas teachers' assessment of peer relationships suggested otherwise – an absence of differences between students assessed as gifted and those who are not. By comparing self-concept and perceived competence of gifted and non-gifted students, Litster and Roberts (2011) concluded that gifted students rated academic and behavioural competencies significantly higher than non-gifted students. Likewise, gifted students seemed to have a more positive general self-concept, and yet, when compared to non-gifted ones, they perceived their physical appearance and sports competence to be lower. The following variables were found as moderating ones: the classes students attended, the method by which giftedness was identified, and the year of publication. The less recent papers favour the absence of differences between gifted and non-gifted children, while recent studies point to their existence. The reason behind these opposite interpretations seems to primarily be in the fact that the methods and measures that were used to identify giftedness differed across time periods.

Research conducted on preschool children indicated that there were no behavioural, emotional or social differences between gifted children and non-gifted children (Peyre, Ramus, Melchior, Forhan, Heude and Gauvrit, 2016). Gifted children were generally more socially mature (Robinson, 2008).

On the other hand, the results indicated an insufficient adaptation of gifted students, which manifested in the greater presence of behavioural disorders in gifted students as opposed to non-gifted ones (Guénolé et al., 2013). Moreover, gifted students tend to have a greater sense of isolation and are less satisfied with social support (Vialle, Heaven and Ciarrochi 2007). When it comes to comparisons in terms of well-being, the data indicated a relatively small difference concerning lower self-esteem and social acceptance in gifted students (Kroesbergen, van Hooijdonk, Van Viersen, Middel-Lalleman and Reijnders, 2015). Gifted children seem to have the same needs as everyone else, but is their interests and aspirations that make them special. Diverging interests and environment not suited to their interests can become a possible source of boredom, which may lead to depression, social anxiety (Stankovska, Pandilovska, Taneska and Miftari Sadiku 2013) and isolation (Shechtman and Silektor, 2010).

An important issue associated with giftedness is related to personal characteristics and their interrelationship, and consequently to the adaptation of gifted children. In this context, the relevant set of variables covers both parents' gender and education. Research results indicate that male children whose parents have high-status jobs are more likely to be identified as gifted (Parekh, Brown and Robson, 2018). Likewise, academic achievement is connected to parents' level of education (Guez et al. 2018), as well as with the students' gender (Parekh, Brown and Robson, 2018). Male students are more often identified as gifted, while female students are identified as academically more successful. Students who have parents with higher levels of education are typically more successful in terms of academic achievement, as opposed to those who have parents with lower levels of education. The level of education, employment and average earnings of both parents stand out as significant predictors of giftedness and they have been shown to explain 5% of the variance in college enrolment (Conejeros-Solar and Gómez-Arízaga, 2015). Research conducted on children between the ages of 4 and 7 indicated the importance that socio-demographic properties have on giftedness.

M. Klarin, S. Šimić Šašić & A. Proroković: *The Social, Cognitive and Socio-Demografhic Profile of Potentially Gifted Children*

361

For example, boys show a higher level of creativity than girls, while children who attend private preschools tend to be more creative than the ones attending public schools, and the same goes for children whose parents have better economic status. It has been assumed that more educated parents, and parents with better earnings, understand their child's needs better and use adequate parenting behaviours (Çetinkaya, 2010). It has been shown that stimulative parenting and school environment contribute to the adaptation of gifted children (Reis and Renzulli, 2003), i.e., they affect both self-image and the child's adaptation (Bain and Bell, 2004). However, some authors were keen to conclude that the identification of giftedness connects more to economic wealth than achievement, which in turn makes giftedness a symbol of prestige and academic dominance (Parekh, Brown and Robson, 2018).

In any case, giftedness is doubtlessly a very complex phenomenon that depends on three factors, as described in Renzulli's three-ring model. Nonetheless, identification of gifted children has been affected by individual socio-demographic profile. In order to resolve some of the aforementioned issues, one of the goals of this research is to identify clear social and socio-demographic characteristics that potentially distinguish gifted children from non-gifted ones.

The primary goal of our research was to examine the differences in academic achievement, academic competences and inter-peer sociability, between children who were identified as potentially gifted by teachers and those who were not. Additionally, the research examined the differences between the two groups of students with regard to some of the socio-demographic characteristics (gender, parents' education, place of residence). Finally, we made an effort to determine the predictive value of socio-demographic characteristics and characteristics of gifted children when it comes to explaining their academic competence and sociability.

Method

Research participants

The study involved 76 primary school teachers from all across the Republic of Croatia, with assessments being collected for 1419 students of the 2nd grade of primary school (some of the data was incomplete). The nation-wide sample consisted of 48.27% (N=685) female students and 49.47% (702) male students coming from four different regions of the country:

littoral part of Croatia, N=910 (64.13%); Lika, N=81 (5.71%), Central Croatia N=303 (21.35%); Slavonia, N=125 (8.80%). When it comes to the place of residence, 77.38% of students were from an urban area (N=1098), and 22.62% were from a rural area (N=321).

The subgroup of participants on which we collected data on cognitive abilities and on parents' education consisted of students from primary schools in Zadar (N=487). As far as data on parents is concerned, the information was collected on 378 parents. The average age of mothers was 37.73 years, while the average for fathers was 40.31 years. The majority of parents completed high school education, with some having acquired a university degree or having completed higher vocational education, while the smallest portion of parents had only primary school education. The percentage of girls in this subsample was 51.59%, and boys 48.15%, which corresponds to the entire sample.

Measuring instruments:

A scale for assessing potential giftedness in children (Šimić Šašić, Proroković, Klarin and Šimunić, 2020). The scale consists of 13 subscales and a total of 86 statements. Eleven subscales refer to abilities (linguistic, logical-mathematical, spatial, musical, physical-kinaesthetic, interpersonal, intrapersonal, artistic, technological, theatrical and attentive). The data obtained from the subscales on their technological abilities and attention were not included in further analyses because a large number of assessments on the subscale of technological abilities were missing (the teachers found it difficult to provide them), while assessments of attention correlated highly with other subscales of abilities. Additional two subscales evaluated motivation (task orientation) and creativity. This scale was intended for teachers. Their task was to provide assessments on a five-point rating scale in relation to specific students – whether something applies to them or not (1 – *doesn't apply at all*, 5 – *fully applies*). They were also provided an option *I am unable to assess*. The results on all subscales have been formed as the sum of assessments on their corresponding individual statements. Higher scores on these subscales indicate that a particular trait/ability has developed more in an individual.

The criterion for identifying potential giftedness was an achievement on at least one of the subscales of abilities, and on the scales of motivation and creativity, which ranked above the 3rd quartile, i.e., it fell within the 25% of the highest assessments.

M. Klarin, S. Šimić Šašić & A. Proroković: *The Social, Cognitive and Socio-Demographic Profile of Potentially Gifted Children*

363

As a result, two groups of students were formed: those who are potentially gifted and those who are not gifted according to the criteria defined. Based on it, 233 students were identified as potentially gifted (16.51%), and 1178 as non-gifted (83.49%). The lack of assessments of all student characteristics resulted in a different number of participants in individual analyses.

Adapted questionnaire of the *Academic competence* (Zeidner and Schleyer, 1998) is a scale containing 6 statements on a five-point scale where 1 indicates *the stated statement does not apply to the student at all* and 5 indicates *the stated statement fully applies to the student*. The results of our research revealed a one-factor structure of this measuring instrument with Eig=3.98, while the total variance explained was 66.26%. The following is an example of a typical statement included in the questionnaire: *He/she often does not understand teaching materials.* The score on the questionnaire stands for a teacher's assessment of student's academic competence.

Adapted peer sociability questionnaire (Curby, Rudasill, Rimm-Kaufman and Konold, 2008) consisted of 5 statements with the possibility of answering on a five-point scale where 1 indicated *the stated statement does not apply to the student at all* and 5 indicated *the stated statement fully applies to the student*. The results revealed a one-factor structure (Eig. =4.13) which explained 82.65% of the common variance. With statements such as *He/she has a lot of friends*, the overall result on the questionnaire represents a teacher's assessment of student's social competence.

The study also collected data on academic achievement, students' gender and, only for sub-sample purposes, data on the parents' level of education and the place of residence.

Procedure

The research was carried out as part of a wider project *"ZadarZaDar" Doživljajna pedagogija u prirodoslovnim predmetima za razvoj darovitih učenika* UP.03.2.2.02.0102 (eng. Experimental pedagogy in natural sciences for the development of gifted students). The teacher's task was to assess each student, but it also included data on school achievement, gender, place of residence, and for a subgroup of children attending primary schools in Zadar County, we collected data on parent's level of education (N=371).

Results

The first research question referred to the potential differences between two student peer groups in terms of their academic achievement, academic competence and sociability.

Table 1. Results of descriptive statistics and internal consistency for scales assessing potential giftedness in children, academic competence, sociability among peers and academic achievement for children identified as either gifted or non-gifted (N=1419)

Variable	N_{gifted}	$N_{non-gifted}$	M_{gifted}	$M_{non-gifted}$	SD_{gfted}	$SD_{non-gifted}$	Cr α
Linguistic	231	1175	4.77	3,01	0.50	1.08	0.96
Logical-mathematical	232	1175	4.60	2.82	0.65	1.18	0.98
Spatial	210	981	4.80	3.42	0.64	1.03	0.93
Musical	213	1093	4.54	3.22	0.81	1.11	0.93
Physical Kinaesthetic	233	1178	4.86	3.86	0.60	1.05	0.92
Intrapersonal	232	1171	4.15	2.96	0.63	0.88	0.70
Interpersonal	232	1175	4.66	3.30	0.53	0.96	0.92
Artistic	233	1170	4.61	3.35	0.85	1.13	0.91
Theatrical	232	1177	4.76	3.29	0.61	1.16	0.93
Motivation	233	1146	4.91	3.15	0.30	1.05	0.97
Creativity	233	1168	4.80	2.90	0.37	1.04	0.96
Academic competences	219	1167	4.88	3.54	0.50	1.03	0.90
Sociability	233	1177	4.82	3.75	0.61	1.02	0.95
Academic achievement	216	1108	4.97	4.80	0.29	0.44	

Given that the variance was inhomogeneous in both groups and that the Levene's homogeneity test is deemed important in this context, we turned to the non-parametric Mann-Whitney U test, and the results are shown in Table 2.

When it comes to differences across the observed groups, the results show better academic achievement, more positive academic competence and greater sociability among the peers of gifted students when compared to non-gifted ones.

M. Klarin, S. Šimić Šašić & A. Proroković: *The Social, Cognitive and Socio-Demografhic Profile of Potentially Gifted Children*

365

Table 2. Results of the Mann-Whitney U test for academic achievement, academic competence and sociability among peers between non-gifted students (group 1) and potentially gifted students (group 2)

	Rank Sum 1	Rank Sum 2	U	Z	p	N1	N2
Academic achievement	713542.0	163608.0	99156.00	-3.99	0.00	1108	216
Academic competences	708660.5	252530.5	27132.50	-18.52	0.00	1167	219
Sociability	741060.5	253694.5	47807.50	-15.73	0.00	1177	233

The next research question referred to differences between potentially gifted and non-gifted students with regard to some socio-demographic characteristics. To this end, a series of χ^2 tests was done and they are shown in Tables 3, 4, 5, 6 and 7.

Table 3. Differences between groups of potentially gifted and non-gifted students in terms of gender

	Gifted students		Non-gifted students		Total	
	f	%	f	%	f	%
Boys	99	43.23	598	52	697	50.54
Girls	130	56.77	552	48	682	49.46

$\chi^2 = 5.87$; df=1; p=0.015

Results shown in Table 3 indicate the existence of a statistically significant difference between groups of potentially gifted and non-gifted students with regards to gender. Girls were more often identified as potentially gifted than boys.

Table 4. Differences between groups of potentially gifted and non-gifted students with regards to their place of residence

	Gifted students		Non-gifted students		Total	
	f	%	f	%	f	%
Rural area	34	10.59	287	89.41	321	22.75
Urban area	199	18.26	891	81.74	1090	77.25

$\chi^2 = 10.57$; df=1; p=0.001

Results from Table 4 indicate that there were significantly more potentially gifted students who lived in the urban area compared to those who lived in the rural area. Tables 5 and 6 reveal significant differences between potentially gifted and non-gifted students with regard to the education of the father and the mother.

Since there were fewer parents in categories with lower educational status, the educational status has been reclassified into two categories: one category contained parents with completed high school education, and the other contained parents with degrees from higher vocational institutions and universities.

The results (Table 6) indicate a clear statistically significant difference between groups of potentially gifted and non-gifted students with regards to fathers' level of education. Fathers of gifted children held post-secondary level degrees in 50.88% of cases, and only 27.96% of fathers of non-gifted children had the same qualification.

Table 5. Differences between gifted and non-gifted students with regards to father's level of education

Level of education	Gifted students		Non-gifted students		Total	
	f	%	f	%	f	%
Completed secondary level of education	28	49.1	170	72.03	198	67.58
Higher vocational education or a university degree	29	50.88	66	27.96	95	32.42

$\chi^2 =10.99$; df=1; p=0.001

Table 6. Difference between potentially gifted and non-gifted students with regards to the mother's level of education

Level of education	Gifted students		Non-gifted students		Total	
	f	%	f	%	f	%
Completed secondary level of education	20	32.79	159	57.61	179	53.12
Higher vocational education or a university degree	41	67.21	117	42.39	158	48.88

$\chi^2 =12.36$; df=1; p=0.000

Mothers' levels of education were also significantly different between groups of gifted and non-gifted children. The results show that mothers of gifted children are generally of higher educational status.

The next issue in our study concerned the predictive value of socio-demographic characteristics (gender, place of residence and education level of mother and father), as well as some other characteristics of potentially gifted students, when it comes to explaining assessments of academic competence and sociability among peers.

In the first step, the education of the mother was singled out as a significant predictor of academic competence, but it lost its significance the second step, turning it over to verbal-linguistic, logical-mathematical, visuo-spatial, musical and intrapersonal abilities, and finally, motivation.

Both sets of predictors explained 79% of the variance in academic competence. When it comes to sociability, the gender of the child and the education of the mother stood out as predictors in the first step. In the second step, mother's education remained a significant predictor together with visuo-spatial abilities, intrapersonal and especially interpersonal abilities. Both sets of predictors explained 71% of the variance in sociability among children.

Table 7. Results of hierarchical regression analyses where the sociodemographic characteristics and other traits of potentially gifted children were included as potential predictors, while the assessments of academic competence and sociability among children were the criteria (N=187)

		academic competences		sociability	
		β		β	
Step 1	Gender	-0.02	R=0.30	-0.17*	R=0.27
	Rural/Urban area	0.07	R^2=0.09	-0.02	R^2=0.07
	Father's education	0.12	$F_{(4,187)}$=4.61	0.00	$F_{(4,187)}$=3.73
	Mother's education	0.21*	p=0.001	0.21*	p=0.006
Step 2	Gender	-0.04	R=0.89	-0.04	R=0.84
	Rural/Urban area	-0.05	R^2=0.79	-0.01	R^2=0.71
	Father's education	0.05	$F_{(15,176)}$=44.01	-0.02	$F_{(14,177)}$=29.05
	Mother's education	0.04	p=0.000	0.13*	p=0.000
	Verbal-linguistic abilities	0.21*	ΔR^2=0.70	-0.10	ΔR^2=0.64
	Logical-mathematical abilities	0.36*	p=0.000	0.03	p=0.000
	Visuo-spatial abilities	0.12*		0.15*	
	Musical abilities	-0.16*		-0.08	
	Physical-kinaesthetic abilities	-0.01		0.07	
	Intrapersonal abilities	0.18*		-0.29*	
	Interpersonal skills	0.03		0.75*	
	Artistic abilities	-0.04		0.03	
	Theatrical abilities	0.10		0.09	
	Motivation	0.40*		0.13	
	Creativity	-0.02		0.03	

Discussion

Previous research did not provide consistent results when it comes to the potential of high intellectual abilities to clearly differentiate students in terms of their school achievement and some socioemotional features. Consequently, the primary objective of our research was to determine whether the group of students identified as potentially gifted by teachers differ in some characteristics from students who were deemed otherwise.

The results indicate that teachers' assessments of sociability and academic competences differ across these two groups of students. In other words, teachers assessed that potentially gifted students were academically more competent and more successful in peer relationships. Based on the data indicating their better school performance, we argue that potentially gifted children tend to be more successful in mastering educational content. Despite some findings that support the discrepancy in the development of cognitive abilities in relation to social and emotional development, or the propositions that gifted children resemble their peers in socioemotional development (Silverman, 2002), the results of this research suggests otherwise. Teachers assess intellectually advanced children as being more academically and socially competent than average children. Based on the results of this research, it appears justified to conclude that potentially gifted students in the developmental period of middle childhood not only have above-average cognitive abilities, but are more socially competent and more successful in peer relationships; these results are corroborated by some other research as well (see França-Freitas, Prette and Prette, 2014). The abilities that gifted children possess, especially in terms of self-regulation, empathy and self-efficacy, probably contribute to the quality of their relationships with peers (Guez et al., 2018). Moreover, gifted students are probably better in their cognitive evaluations, which should contribute to more effective coping with different social situations. We could also assume that better success in school contributes to a more positive self which in turn contributes to social competence. Nevertheless, some studies have spoken in favour of higher academic competences (Ayğar and Gűndoğdu, 2017; Infantes-Paniagua, Fernández-Bustos, Ruiz and Contreras-Jordán, 2022), but weaker social competences when it comes to children in middle childhood years and adolescent age (Infantes-Paniagua et al., 2022). This leads us to conclude that the child's age should be kept in mind when interpreting the obtained research results. Despite the fact that giftedness manifests itself at children's earliest ages, the self-image develops as a function of social relationships and social comparison. School becomes a place where students compare themselves, compete, and make efforts in all fields of development. Experiencing yourself as different, or gifted, tends to be a process that occurs during adaptation to various cognitive tasks and environmental demands. Correspondingly, the research conducted on children in their early childhood phase indicated an absence of differences between gifted children and those who were not (Peyre et al., 2016), which does not entail that these differences will remain invisible as the child

M. Klarin, S. Šimić Šašić & A. Proroković: *The Social, Cognitive and Socio-Demografhic Profile of Potentially Gifted Children*

369

grows up. In the end, the social maturity that some authors talk about (Robinson, 2008) and that gifted children seem to possess, contributes to the use of mechanisms that enable them to successfully adapt in peer relationships. In this context, we ought to stress the importance of assessing and identifying giftedness in terms of cognitive abilities and academic success, as well as monitoring socioemotional requirements that may be specific to gifted children.

The following relevant set of variables that was tested in the context of students' potential giftedness were socio-demographic ones, especially those pertaining to student's gender, place of residence and their father's and mother's education. The obtained results reveal that female students were identified as potentially gifted more often than their male colleagues, and that the students who live in the urban areas were more frequently identified as gifted as opposed to students from smaller rural areas. Likewise, the students who were identified as potentially gifted more often had both parents of higher educational status.

The results of a large number of studies indicate a tendency of giftedness being more frequently identified in male students (see Greeman and Garces-Bacsal, 2015; Petersen, 2013; Çetinkaya, 2010; Parekh, Brown and Robson, 2018). In this context, Petersen discussed gender bias when identifying gifted students (2013); her meta-analysis of 130 studies showed that male students were 1.19 times more likely to be identified as gifted. The author pointed out that these gender differences were most prominent with students of pre-adolescent age. One related hypothesis that agrees with such results refers to greater variability of cognitive abilities in male students, which in turn relates to higher probability of them being identified as gifted compared to female students (Petersen, 2013; Freeman and Garces-Bacsal, 2015). Also, it is important to point out that the identification of giftedness with regard to gender differs according to the area of giftedness. The ratio of gifted male students to gifted female students in the STEM field is 3:1, while the ratio in the area of verbal giftedness favours the female students and is 2:1 (Heilbronner, 2013), i.e., giftedness appears to heavily depend on the field in question. When it comes to teacher assessments as a criterion, male students tend to be more often identified as gifted compared to female students (Greeman and Garces-Bacsal, 2015). It is certainly possible that the difference stems from the assumption of gifted female students being less able to withstand pressure and competitiveness, as well as needing more time to think when performing tasks when compared to their male colleagues (Boaler, Wiliam and Brown, 2000).

The results of our research do not speak in favour of male-dominant giftedness; on the contrary, female students were more often assessed as gifted by teachers. However, it seems important to point out that some studies support these findings when it comes to teacher assessments of younger children, where female students tend to be identified as gifted more frequently, which then changes at a later age, with male students being more often identified as gifted (Reis, 2002).

Furthermore, a higher level of parental education has proven to be a characteristic of gifted children in other studies as well (Guénolé et al., 2013). The assumption has been that parents with higher levels of education better understand their child and their needs, and at the same time have a better chance to financially afford their children some, otherwise less accessible, life experiences that stimulate intellectual development. Similar research conducted on gifted children aged 4 to 7 shows that their fathers and mothers were more likely to work as government officials, which provided the family and children greater financial support and consequently a richer environment that encourages giftedness (Çetinkaya, 2010). The results of our research support these findings, i.e., point to the conclusion that children of parents with higher educational status were more likely to be identified as gifted. In this regard, Sekulić-Majurec (1995) argued that the fact that gifted children appear more often in families of higher social and educational status does not entail them being more often born in these families, but only indicates that a higher socioeconomic status provides an incentive for the development of giftedness. A richer environment certainly appears to contribute to richer experiences and talent development. It seems plausible to assume that parents with a higher educational status tend to have higher expectations of their child and provide them with support in this regard. Additionally, place of residence has proven to be a significant determinant of potential giftedness; potentially gifted children live in urban areas more often than children who are not identified as such. We should interpret this data in a similar manner as with the role of parents' education; urban environments probably provide children with significantly more content and opportunities for giftedness to manifest, develop, and to be subsequently identified.

The results of the regression analysis indicate a significant effect that some socio-demographic characteristics had in explaining academic competence and sociability, however, the independent contribution of cognitive abilities, motivation and creativity was significantly greater for both academic competence and sociability.

M. Klarin, S. Šimić Šašić & A. Proroković: The Social, Cognitive and Socio-Demografhic Profile of Potentially Gifted Children

371

In other words, the variables that define giftedness according to Renzulli's model explain both criterion variables to a considerably greater extent in this research. Finally, we could conclude that cognitive abilities and motivation stand out as significant predictors of academic competence, whereas interpersonal and intrapersonal abilities as predictors of sociability. Gender, parents' education and place of residence contribute to a significantly smaller degree in the explanation of variance regarding both academic competences and socialization among peers.

Conclusion

The results of this research lead us to infer greater academic competence and better socialization skills among peers in children who have been identified as potentially gifted as opposed to those who have not. In addition, girls were more often recognized as gifted. Parents of potentially gifted children tend to have a higher educational status and these families live more often in urban areas compared to parents of non-gifted children. In general, the results of this study suggest that the factors of giftedness, proposed by Renzulli's three-ring model of giftedness, contribute significantly more to academic and social competences in children than their socio-demographic characteristics.

The primary contribution of this research has been a rather large sample size, as well as its representativeness, which enables the generalization of the obtained results. Moreover, given the rarity of research regarding the socioemotional development of gifted children, the research has not only theoretical, but also important practical value for all experts who work with gifted children in the educational system. On the other hand, the method used to assess the potential giftedness in children should be singled out as a serious shortcoming of this research, i.e., the study relied solely on teachers' assessments of children's abilities and other characteristics. Such assessments need not necessarily be objective, due to some individual inclinations and other biases of those who assess, or their inability to have complete insight into all behavioural aspects of the children they assess. Future research should also take into account some other criteria when identifying potential giftedness in children (e.g., apply greater number of specific cognitive abilities tests, examine some behavioural correlates of giftedness, mutually compare performances and achievements among children etc.).

Longitudinal research and long-term tracking of children identified as gifted should also help us figure out the best criteria for identifying giftedness.

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373

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INVESTIGATING THE SOURCE OF STUDENT SELF-EFFICACY AND ITS RELATIONS TO AFFECTIVE FACTORS IN MATHEMATICS LEARNING

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Abstract/Izvleček

The purpose of this study was to explore the source of students' self-efficacy and its relation to motivation, attitude, and students' perception of teacher support in mathematics learning. Three hundred and fifty participants were selected using a stratified random sampling method. The study was survey-based and quantitative; data were analysed through statistical tests. Findings showed that most students reported having good grades in math. The source of self-efficacy in mathematics significantly correlates with attitude, intrinsic motivation, and students' perception of teacher support.

Raziskovanje izvora študentove samoučinkovitosti in njenega odnosa do afektivnih dejavnikov pri učenju matematike

Namen te študije je bil raziskati vir samoučinkovitosti učencev in njihov odnos do motivacije, njihova stališča ter njihovo dojemanja podpore učiteljev pri učenju matematike. Tristo petdeset udeležencev je bilo izbranih z metodo stratificiranega naključnega vzorčenja. Študija je temeljila na anketi in kvantitativni analizi; podatki so bili analizirani s statističnimi testi. Ugotovljeno je bilo, da ima večina učencev dobre ocene pri matematiki. Vir samoučinkovitosti pri matematiki je pomembno povezan z odnosom, notranjo motivacijo in učenčevim dojemanjem podpore učitelja.

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Introduction

Describing the factors behind student performance in mathematics learning is a challenging task for researchers. Some researchers have suggested that self-efficacy is a powerful factor in determining student achievement. Jiang et al. (2014) defined self-efficacy as the conviction that one can succeed in certain purposes. Self-efficacy also plays a critical role in shaping motivation, learning, engagement, and achievement (Chong et al., 2018).

In Indonesia, students have struggled with mathematics achievement, according to international surveys such as PISA (OECD, 2018) and TIMMS (Patahuddin et al., 2020). Although researchers such as Usher and Pajares (2009) suggested that student performance can be explained by measuring student self-efficacy, there is a scarcity of investigation about the extent of Indonesian students' self-efficacy in mathematics learning. Suryadi and Santoso (2017) reported that self-efficacy was associated with achievement, although the contribution of student self-efficacy was weak. Simamora et al. (2019) suggested that self-efficacy could be increased using a certain method, but the researchers did not explain how student self-efficacy could do so. However, both studies were conducted in secondary schools, and there was no explanation of whether beliefs were associated with other factors.

In the literature review, the association of self-efficacy beliefs with non-cognitive factors (e.g., attitudes, motivation, and perception of teacher support) in mathematics learning has been extensively studied in research (Chong et al., 2018; Li, 2012; Skaalvik et al., 2015). Attitude is a personal tendency to respond to an object positively or negatively. Intrinsic motivation involves doing an activity for the inherent satisfaction of the activity itself (Schukajlow et al., 2017). Perceptions of teacher support are students' beliefs about their teacher in mathematics learning, for example, the perception of whether the mathematics teacher is friendly or not (Op't Eynde and De Corte, 2003). For example, Li (2012) reported on the association between self-efficacy and attitudes. The more positive student attitudes increase their self-efficacy in mathematics. Skaalvik et al.(2015) through their investigation in secondary schools, suggested that self-efficacy was strongly associated with intrinsic motivation in mathematics learning. Chong et al. (2018) stated that self-efficacy moderately correlated with students' perception of teacher support, where both self-efficacy and students' perception of teacher support also determined performance in grades 7-8.

S. Amien, R. Abidin & M. Ridhwan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

377

Therefore, most of the previous research (Chong et al., 2018; Li, 2012; Skaalvik et al., 2015) was conducted in secondary schools and focused on a particular aspect of self-efficacy in mathematics. Little attention has been addressed to the extent to which students shaped their self-efficacy beliefs in mathematics. Also, little is known whether the source of self-efficacy beliefs is associated with attitudes, motivation, and student perception of teacher support, especially for primary education. Therefore, in the present study, we investigated the source of self-efficacy beliefs and their relation to attitudes, motivation, and perception of teacher support. Four research questions were formulated to answer the research purposes of the present study:

Research questions:

1. How do students express their source of self-efficacy in mathematics?
2. What kind of relationship can be described in the investigation of the correlation of the source of self-efficacy with attitude toward mathematics?
3. What insight can be gained through investigation into the source of self-efficacy and motivation toward mathematics?
4. What kind of correlation can be explained through investigation into the source of self-efficacy and students' perception of the teachers?

Theoretical framework

Self-efficacy and academic performance

Most definitions of self-efficacy in the literature review refer to Bandura's idea; self-efficacy is the judgment of confidence to perform tasks or succeed in activities (Ellez, 2020; Yıldırım and Güler, 2020; Usher and Pajares, 2009). Self-efficacy is also perceived as the concept built on the perception that students are individuals who actively influence the direction of their learning approach and achievement (Yıldırım and Güler, 2020; Rohatgi et al., 2016; Bandura, 1997). According to Hatlevik et al. (2018), self-efficacy beliefs are personal beliefs about what someone is capable of doing or learning and are not the same as knowing what to do.

The source of self-efficacy consists of four dimensions: mastery experience, vicarious experience, social persuasion, and physiological state (Usher and Pajares, 2009). Mastery experience is the degree to which a student has experienced academic success or failure (Gao, 2020). We would ask students about their experience in the past rather than their grade in academic achievement.

Vicarious experience deals with the degree to which students perceive the academic skills of career role models, parents, teachers, and older students. Social persuasion relates to external encouragement for students in their academic capabilities, such as support from their parents, teachers, and peers. Physiological states are physiological aspects such as feelings about the subject, how much students like or dislike the subject, feeling positive or negative about the subject, etc. (Gao, 2020; Klassen, 2004). In the present study using these constructs, researchers testify to the intercorrelation and the influence of this self-efficacy on other aspects such as motivation, attitude, and achievement.

Attitude towards mathematics

Attitude concerns students' positive or negative feelings about studies and whether these determine student success in all subjects. As mentioned by Aiken (1970), attitude is a tendency on the part of an individual to respond positively or negatively to some object, subject, situation, concept, or another person. According to Nja et al. (2022), attitude is an emotional and mental entity that propels students to take any strategy toward an object or subject. Di Martino and Zan (2011) state that there are two kinds of attitude definitions: simple and three-dimensional. The simple definition refers to the terms positive and negative as associated with the current subject, while the three-dimensional definition incorporates emotional dispositions, beliefs, and behaviour. In this study, however, researchers emphasize students' positive attitudes toward mathematics to represent the consistency and affirmation of mathematics learning.

Intrinsic motivation
Concerning the construct of motivation, there is a variety of conceptions among researchers. Commonly, researchers differentiate motivation into two categories: intrinsic motivation and extrinsic motivation. Intrinsic motivation refers to doing an activity for the inherent satisfaction of the activity itself (Ryan and Deci, 2020; Schukajlow et al., 2017). Intrinsic motivation refers to the student's tendency to enjoy an activity with no need for an external reward because he/she is driven by inherent value (Karimi et al., 2022).

S. Amien, R. Abidin & M. Ridhwan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

379

For instance, students enjoy mathematics learning because of their inherent interest, or they experience satisfaction from mastering mathematical knowledge. In contrast, extrinsic motivation refers to the commitment to achieve something because of external factors (Yarin et al., 2022).

For instance, students commit to reaching a high score in mathematics because they want to get rewards from their teachers and parents. In the present study, we are interested the value of inherent personal value. Therefore, researchers investigate the intrinsic motivation of students in mathematics learning.

Students' perception of teacher support

In mathematics learning, the teacher also plays a key role in determining students' learning and development. The ways teachers transform and set the class are important to cultivate students' beliefs, motivation, and achievements (Raufelder et al., 2016). The habits of teachers in teaching and solving problems in mathematics also encourage students to solve mathematical tasks using the same techniques (Garofalo, 1989). De Corte (2015) deals with students' perception of mathematics teachers in mathematics learning as part of their beliefs about the mathematics class context. These perceptions involve student perceptions of their teacher in mathematics learning. For instance, our teacher is friendly to us, or our teacher really wants us to understand mathematics concepts, not only memorize them (Op't Eynde and De Corte, 2003). In the present study, the researcher seeks to measure whether students' perception of their teacher is associated with their self-efficacy in mathematics learning.

Methods

Participants

Twelve classes were selected randomly from five schools in Surabaya, Indonesia. Participants in this study were 350 students from fifth and sixth grade (total students grade fifth-sixth = $\pm$ 1,250 from 5 schools). The participants in the present study were 9-12 years old. All the schools were in urban areas, and the school system uses zoning. The location between school and home was close, meaning that there were students in every school from various economic backgrounds. Table 1 shows the demographics of the study sample.

Table 1. Demographics of participants

Category	N	Percentages
Fifth grade	169	48%
Sixth grade	181	52%
Boys	166	47%
Girls	184	53%
Age 9	7	2%
Age 10	114	33%
Age 11	175	50%
Age 12	54	15%

Instruments

Source of self-efficacy. Sixteen items were selected from the source mathematics self-efficacy questionnaire developed by (Usher and Pajares, 2009). This instrument consisted of four dimensions; we selected four items to measure students' *mastery experience*, five items for *vicarious experience*, four items for *social persuasion*, and three items for the *physiological state.* For instance: "I do well on my examination," "Seeing kids do better than me in the class pushes me to do better," "My mind goes blank, and I am unable to think clearly during examination," and "My whole body becomes tense during my learning in class." This questionnaire uses a Likert scale (1= Strongly disagree to 5 = Strongly agree).

Attitude towards mathematics. Attitude is students' evaluation of and feelings about the learning process, whether positively or negatively. These attitudes were measured by four items adapted from Grootenboer and Marshman (2016). Examples of these items were "Mathematics learning is very cool," "I like learning mathematics," and "I am happy working on mathematics." This questionnaire uses a Likert scale (1= Strongly disagree to 5 = Strongly agree).

Intrinsic motivation. Students' intrinsic motivation in the present study was measured by a five-item set adapted from PISA. These are some sample items: "I enjoy reading about mathematics," and "I do mathematics because I enjoy it." This questionnaire uses a Likert scale (1= Strongly disagree to 5 = Strongly agree).

Perception of teacher support. Students' perception of teacher support is the students' perception of the role and functioning of their mathematics teachers. This perception was measured using three items. These items were adapted from a mathematics-related beliefs system questionnaire (MRBQ) developed by Op't Eynde and De Corte (2003).

S. Amien, R. Abidin & M. Ridhwan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

381

For instance, "My teacher tries to make the lessons interesting," and "My teacher gives me time to really explore new problems and to try out possible strategies." This questionnaire uses a Likert scale (1= Strongly disagree to 5 = Strongly agree).

Procedure
Researchers administered the questionnaire to students in the fifth and sixth grades. The class was selected randomly in every school. The teacher participated in the present study to help with the data collection. This study uses the paper-pencil test technique. Students completed the profile and the questions about personal background, such as gender. Students were allowed to complete the questionnaire at home. This technique was chosen to avoid student fatigue. We allowed two weeks for students to complete this questionnaire.

Data analysis
Confirmatory factor analysis (CFA) was performed to confirm the validity of the construct of the questionnaire, using the principal component method, TLI, CFI, > 0.9, and RMSEA < .005 to indicate the model fit (Hu and Bentler, 1999). Cronbach alpha was used to examine the reliability of the questionnaire, with an alpha coefficient above 0.7 indicating the instrument's reliability (Hair et al., 2009). In the second step, descriptive statistics were performed to answer the first question. In the third step, Pearson correlation was performed to answer the second to fourth questions.

Results

Confirming the validity and reliability of the instruments
CFA confirmed the validity of this questionnaire by confirmatory factor analysis (CFA). We found the fit model, CFI = 0.93, TLI = 0.91, RMSEA = .06, Chi-Square = 281.74, df = 125, p < .001, The loading factors range from 0.44 – 0.81. We reexamined the reliability of each factor. The result showed that all the factors from this questionnaire were reliable. Mastery experience (α =.77), vicarious experience (α =.78), social persuasion (α =.71), and physiological state (α =.79). This questionnaire used a Likert scale (1= strongly disagree to 5 = Strongly agree). We also confirmed the reliability of the attitude, motivation toward mathematics, and students' perception of teacher support.

The Cronbach alpha coefficient showed that attitude (α =.88), motivation, and students' perceptions of teacher support (α =.82) were reliable.

Descriptive statistics and the correlation of each source of self-efficacy factor
Table 2 describes the descriptive statistical analysis of the source of student self-efficacy beliefs in mathematics. Generally, all the sources of self-efficacy dimensions were mutually correlated.

Table 2. Descriptive statistics on student self-efficacy in mathematics

Variables		Mean	SD	1	2	3
1.	Mastery experience	3.84	0.72	1		
2.	Vicarious experience	3.56	0.68	.60		
3.	Social persuasion	3.71	0.71	.50	.57	
4.	Physiological state	2.75	0.82	-.14	-.24	-.03

All variables show correlation except the correlation between physiological state and social persuasion (r = .03). The highest correlation occurs for the pair vicarious experience and mastery experience (r = .60). Social persuasion also correlates with physiological mastery experience (r = .50) and vicarious experience (r = .57). Physiological state correlates with mastery experience (r = -.14) and vicarious experience (r = -.24).

RQ1; How do students express their source of self-efficacy in mathematics?
Table 3 describes statistics for the items dealing with student source of self-efficacy in mathematics. *Mastery experience* shows students' perception of their experience in mathematics learning. Generally, students reported positive experiences with mathematics learning, as indicated by the high mean results concerning the corresponding items (3.64 - 3.94, on a 5-point Likert scale, 5 = strongly agree). Students expressed strong self-efficacy in their report of doing well concerning mathematics learning, as indicated by the mean result for the item "I do well on mathematics assignments" (M = 3.88, SD = 0.97). Students also reported receiving strong scores in mathematics class, as indicated by the high mean results of the item "I got good grades in math" (M = 3.88, SD = 0.97).

Table 3. Student source of self-efficacy in mathematics learning

Self-efficacy in mathematics	Mean	SE mean	Median	SD
Mastery Experience				
I do well on math assignments	3.64	.05	4.00	1.00
I do well on even the most difficult math assignments, even though math is difficult	3.94	.04	4.00	0.89
I make excellent grades on math tests	3.93	.04	4.00	0.86
I got a good grade in math	3.88	.05	4.00	0.97
Vicarious Experience				
I have good ability in math	3.23	.05	3.00	1.02
I think I can overcome any challenge in math	3.38	.05	3.00	0.94
Seeing my friends doing math assignments encourages me to finish mine too	3.69	.05	4.00	0.96
Seeing friends who are better at math encourages me to study better	3.69	.05	4.00	1.05
The way the teacher does math encourages me to do it too	3.74	.05	4.00	0.96
Seeing other people who are good at math encourages me to study well	3.76	.05	4.00	0.97
Social Persuasion				
My friends like to work with me in math because they think I am good at math	3.39	.04	3.00	0.89
My parents have told me that I am good at mathematics	3.94	.05	4.00	0.94
My teachers have told me that I am good at mathematics	3.81	.04	4.00	0.85
Physiological state				
Only in math class do I get lazy	2.28	.06	2.00	1.14
Learning math makes me tired	2.78	.06	3.00	1.17
My mind goes blank, and I am unable to think clearly when doing math problems	2.79	.06	3.00	1.12
I often get depressed when studying math	2.87	.05	3.00	1.11
I'm often confused and don't understand math	3.02	.05	3.00	1.05

In the *Vicarious experience* factors, the data on the six items of this factor indicate that strong self-efficacy is also formed by other people, as indicated by the high mean results for the items (3.69 – 3.76, on a 5-point Likert scale, where 5 = strongly agree). Students expressed strong self-efficacy in studying math after seeing other students who were good at mathematics, as indicated by the high mean result for the item "Seeing friends who are better at math, encourages me to study better" (M = 3.69, SD = 0.96).

According to the mean result, students also had strong self-efficacy because of seeing the way their teacher solved mathematics problems (M =3.74, SD = 0.96). For instance, the mean result for the item "The way the teacher does math encourages me to do it too" was high (M= 3.74, SD = 0.96). However, we also found that students did not strongly believe in their math capability (M = 3.23, SD = 1.02).

Regarding *Social persuasion*, there were three items of self-efficacy in mathematics. Students' self-efficacy about their capability in math related to group work is moderate, as indicated by the mean result of the item "My friends like to work with me in math because they think I am good at math" (M = 3.39, SD = 0.89). Students strongly believed that they were good at mathematics, according to their parents' points of view, as indicated by the mean result for the item "My parents have told me that I am good at mathematics" (M = 3.81, SD = 0.85).

Concerning *the physiological state*, the data showed that students' response to the five items in this factor was low, as indicated by the mean result (2.28 -3.02, on a 5-point Likert scale), and many students did not decide to agree or disagree. For the first item, "Only in math class do I get lazy," we found that many students disagreed with this item, as indicated by the low mean results (M = 2.78, SD = 1.17). The mean result for the item "I often get depressed when studying math" was 2.87 (M = 2.87, SD = 1.11), indicating that there some students experienced depression during mathematics lessons, even if the number was not high. We found the mean result, "My mind goes blank, and I am unable to think clearly when doing math work", was low (M = 2.79, SD = 1.12).

RQ2; What kind of correlation can be described in the investigation of source of self-efficacy and attitude towards mathematics?

There is a scarcity of investigation about the relationship between self-efficacy and attitude toward mathematics, particularly in mathematics learning. A Pearson correlation was performed to examine the relationship between student self-efficacy in mathematics and their attitudes toward mathematics (See Table 4). All the factors of self-efficacy in mathematics correlate with attitudes towards mathematics. Mastery experience has a positive correlation with attitudes towards mathematics (r = .39, p < .001).

S. Amien, R. Abidin & M. Ridhwan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

385

Table 4. Correlation between source of self-efficacy mathematics and attitude, students' perception and motivation

Self-efficacy mathematics	Attitude towards mathematics	Motivation towards mathematics	Students' perception of math teacher
1. Mastery experience	.39**	.33**	.41**
2. Vicarious experience	.46**	.36**	.53**
3. Social persuasion	.36**	.33**	.49**
4. Physiological state	-.14**	.09	-.07*
Mean (SD)	15.59 (3.10)	14.81 (2.99)	15.50 (2.79)

*Note: *significant at a level of 0.05 (p <.05), ** significant at a level of 0.001 (p < .001)*

Vicarious experience gained the highest correlation with attitude towards mathematics, among other factors ($r = .46$, $p <.001$). Social persuasion is associated with attitudes towards mathematics ($r = .36$, $p < .001$), while physiological states are negatively correlated with students' attitudes toward mathematics ($r = -.14$, $p <. 001$). It means that when students perceive that mathematics is difficult for them, they are more likely to have negative attitudes towards learning mathematics.

RQ3: What insight can be gained through investigation into the source between self-efficacy and motivation toward mathematics?

In the previous study, there was a dearth of empirical studies about the relationship between self-efficacy and motivation toward mathematics. We also identified this relationship by performing Pearson correlations (see Table 4). We found that mastery experience was positively correlated with students' intrinsic motivation towards mathematics ($r = .33$, $p < .001$). Vicarious experience was also positively correlated with their intrinsic motivation for mathematics ($r = .36$, p $< .001$). In other words, students' beliefs about their parent's perception of their capabilities in their math assignments correlate positively with intrinsic motivation, such as their desire for mathematics ($r = .33$, $p < .001$). We also found an insignificant correlation between the physiological state and intrinsic motivation ($r = .09$, $p = .16$).

RQ4: what kind of correlation can be explained through the investigation of source of self-efficacy and students' perception of the teachers?

We performed a Pearson correlation between students' perception of their teacher in mathematics and their self-efficacy (See Table 4).

We found that mastery experience positively correlated with their perception of their teacher ($r = .41$, $p < .001$). For instance, students' perceptions that their teacher tried to make mathematics class interesting in the past may also be associated with their

beliefs about themselves, such as believing they could get the highest math score. Vicarious experience correlated positively with their perception of the role of their teacher ($r = .53$, $p < .001$). Social persuasion was positively correlated with their perception of the role of their mathematics teacher in the class ($r = .49$, $p < .001$). Physiological state's correlation with students' perception of the role of their teacher was not significant ($r = -.07$, $p < .005$).

Discussion

The present study has examined student source of self-efficacy in towards mathematics in the Indonesian context by applying the theoretical framework proposed by Usher and Pajares (2009). This theoretical framework consists of four dimensions: mastery experience, vicarious experience, social persuasion, and physiological state. We also examined whether these dimensions correlated with attitude, motivation, and student's perception of the role of their mathematics teacher.

For the mastery experience dimensions, researchers found students reporting a positive experience with mathematics learning. Most students also reported that they got good scores in mathematics. This finding indicates that students have no problem with their scores in mathematics based on their experience. In this stage, we assume that student response on the items about the mathematics grade refers to their achievements in the past, for example, their mathematics score in annual book reports. In the Indonesian system, the minimum grade for all subjects is 75 (range 1-100). In the second dimension, vicarious experience, researchers found students expressing a strong belief that they could be motivated to solve their mathematical tasks by observing the time in which their friends could finish the tasks. Possibly, students who are good at mathematics also inspire their peers in the class. They also become more interested in solving mathematics tasks after watching their teacher solving mathematical problems. According to social cognitive theory, students' beliefs are determined by social stimuli (Bandura, 2001; Usher and Pajares, 2009). Therefore, it is important for mathematics educators to involve students in the working group because this would improve students' beliefs about their own relation to mathematics.

Concerning social persuasion, researchers found that students expressed a strong belief that they were good at math according to their parents, teachers, and friends.

S. Amien, R. Abidin & M. Ridhvan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

387

In the primary education context, we assume that parents' and teachers' appreciation of students would shape student self-efficacy in math. The involvement of parents and greater effort by mathematics educators to care about student learning would increase students' beliefs in their own relation to mathematics.

The physiological state dimension deals with students' mood and anxiety during mathematics learning. Although the percentage was not high, we did find that 25% of students experienced their mind going blank during mathematics class. One explanation for this stage is the way math teachers set the class and choose their teaching strategy; these can be a factor behind student difficulty in understanding math. This finding is important for encouraging mathematics educators to change their teaching strategies and put more effort into improving student self-efficacy beliefs in mathematics learning. The second finding of this study establishes that self-efficacy correlates positively with students' attitudes towards mathematics. This finding is in line with previous research by Kundu and Ghose (2016), who found a relationship between the two ($r = .72$). In the Indonesian context, the correlation between self-efficacy and attitude varies. Mastery experience, vicarious experience, and social persuasion do significantly correlate with attitude towards mathematics. In other words, student self-efficacy, such as the statement "I do well on mathematics assignments", is associated with their feelings, such as the statement "I like working on math." A significant negative relationship has been identified between physiological state and attitudes ($r = -.14$). In other words, students' moods, such as those expressed in the statement "I often get depressed during mathematics classes," are negatively related to their attitudes towards mathematics. The more negative student self-efficacy becomes in mathematics learning, the less positive their attitudes will be towards mathematics. Third, researchers find a significant relationship between source of self-efficacy and intrinsic motivation. This finding was in line with previous studies, such as the finding by Skaalvik et al. (2015) showing a significant correlation between the two ($r = .66$). Researchers found motivation correlating positively with mastery experience ($r = .33$), vicarious experience ($r = .36$), and social persuasion ($r = .33$). In the Indonesian context, students who perceive themselves as having positive experience with mathematics were more likely to have high levels of intrinsic motivation.

Self-efficacy in mathematics also positively correlates with students' perception of the role of their mathematics teacher in the class. This means the way students perceive their mathematics teacher is associated with students' experience in mathematics. Therefore, it is important for mathematics educators to provide a positive experience for students because students' experience in the class is associated with their perception of the role of their teacher.

Limitations and suggestions

Some limitations of this study should be considered for future research. This research measures the relationship between the source of self-efficacy and other relevant factors. There is space to confirm the extent to which self-efficacy in mathematics influences mathematics achievement. However, the findings of this study contribute to providing empirical evidence of studen' self-efficacy in the Indonesian context.

Implication for teaching practice

For mathematics educators, it is important to use this finding as a foundation for improving student achievement. The finding of this study also contribute to unpacking the relationship between self-efficacy, attitude, intrinsic motivation, and students' perception of the function of teachers in mathematics learning. Mathematics education should try to organize their classes to increase student self-efficacy beliefs. This could be achieved by, for instance, arranging the class into working groups. It is also suggested that teachers appreciate each student's effort, since the findings of this study indicate that when teacher or parents appreciate their children, this shapes their children's efficacy in mathematics.

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S. Amien, R. Abidin & M. Ridhwan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

389

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S. Amien, R. Abidin & M. Ridlwan Investigating the Source of Student Self-Efficacy and its Relations to Affective Factors in Mathematics Learning

391

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Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status

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Abstract/Izvleček

The purpose of the study was to examine the level of physical self-perception (PSP) in the Physical Education class, and to determine differences in dimensions of PSP according to gender and nutritional status. On a sample of 283 4th- and 8th-graders in primary school, an anonymous questionnaire was applied. Fourth-graders made higher assessments of their coordination, sport competences, strength, flexibility and endurance than 8th graders. Moreover, significant differences were obtained in certain dimensions of PSP with regard to gender and nutritional status. A low level of PSP may be an obstacle to physical activity. These results indicate that PSP decreases by age and by gender.

Razlike v telesnem samozaznavanju učencev pri pouku športne vzgoje glede na spol in prehranski status Namen raziskave je bil preveriti stopnjo telesnega samozaznavanja (angl. physical self-perception – PSP) pri pouku športne vzgoje ter ugotoviti razlike v dimenzijah telesnega samozaznavanja glede na spol in prehranjenski status. Na vzorcu 283 učencev 4. in 8. razreda osnovnih šol smo izvedli anonimni vprašalnik. Učenci 4. razreda so bolje ocenili svojo koordinacijo, športne kompetence, moč, gibčnost in vzdržljivost kot učenci 8. razreda. Prav tako so bile pridobljene pomembne razlike v nekaterih dimenzijah telesnega samozaznavanja glede na spol in prehranski status. Nizka raven telesnega samozaznavanja je lahko ovira za telesno dejavnost. Ti rezultati kažejo, da se telesno samozaznavanje zmanjšuje s starostjo in spolom.

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Introduction

There are numerous definitions of self-perception, all of which unite a set of opinions and attitudes that an individual has about himself (Neljak, 2013). The different dimensions of self-perception may not necessarily be related. Specifically, a high level of self-perception in one dimension does not necessarily mean that it will be high in other dimensions. There are several dimensions to self-perception, and the relation of those dimensions with healthy behaviour can determine self-improvement actions (Marsh and Redmayne, 1994; Pastor, Balaguer and Garcia-Merita, 2006) such as taking part in PA and having adequate nutrition, in the pursuit of quality of life. For physical education classes (PE), the primary meaning is physical self-perception, more precisely self-perception of one's own motor abilities, which can contribute to better or worse performance on certain motor tasks that are set in front of the student. Physical self-perception is defined as an individual's perception of himself or herself in aspects of physical domains such as strength, endurance, sport ability, and physical appearance (Fox and Corbin, 1989) and is a reflection by students about their capacity to meet the physical limits in PA and sports (Murcia, Gimeno, Vera Lacárcel and Ruiz Pérez 2007). Physical self-perception can contribute to better or worse performance on certain motor tasks that are assigned. It has a significant impact on the development of students' motivation for better motor performance, but also on the frequency of physical exercise. Numerous studies indicate differences in the level of self- perception with regard to gender: male students have better physical self-perception than do female students (Ruiz-Montero, Chiva-Bartoll, Baena-Extremera and Hortigüela-Alcalá, 2020; Palenzuela-Luis, Duarte-Clíments, Gómez-Salgado, Rodríguez-Gómez and Sánchez-Gómez, 2022). Male students perceive better physical self- perception because of the high satisfaction in everything related to the physical activity inside and outside of the school context (Murcia et al. 2007). Authors indicate that strategies focused to improve physical self-perception are necessary in female adolescent students, because personal physical self-perception must be considered as an important social cognitive perspective to provide suitable mental health in children and adolescents (Ruiz-Montero et al. 2020).

Better physical self-perception is mostly related to regular physical exercise (Haugen, Ommundsen and Seiler 2013) and participation in PE classes and sport.

D. Vidaković Samaržija, L. Pavlić Karamatić & J. Alić: Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status

395

More precisely, physical and motor self-perception can be predictors of satisfaction or boredom in PE (Morales-Sánchez et al. 2021). To create a positive environment that includes student engagement in PE class, it is important to understand how outcomes such as motor skills influence motivation for PE class. Both real and perceived approaches to understanding motor skills have implications for healthy lifestyles in childhood and adolescence (Estevan et al. 2021). During early adolescence, PE programs should not be focused only on teaching movement skills but should also foster perceived motor competence to promote motivation for PE, especially among students with lower levels of self-perception (Estevan et al. 2021). The results of numerous studies indicate a positive relationship between the dimensions of self-perception in general and the level of physical activity, and a negative relationship between the dimensions of self-perception and the amount of time an adolescent spends sitting (Fernández-Bustos, Infantes-Paniagua, Cuevas and Contreras 2019; Onetti-Onetti, Chinchilla-Minguet, Martins and Castillo-Rodriguez 2019). We are witnessing an increasingly prevalent sedentary lifestyle among children and young people, and a decreasing level of daily physical activity. Low levels of physical activity are associated with the development of obesity among children and adolescents (Hills, Andersen, and Byrne, 2011; Hong, Coker-Bolt, Anderson, Lee and Velozo 2016), as well as decreasing levels of motor skills (McDonough, Liu, and Gao, 2020). Obesity has become a global public health problem. Of particular concern is the increase in obesity among children and young people, which has increased dramatically over the last few decades. Numerous studies highlight the interaction of multiple factors that contribute to the development of obesity (Sahoo et al. 2015). One of the factors that indirectly contributes to the development of obesity is a low level of physical self-perception. More precisely, a low level of physical self-perception decreases motivation, commitment, and participation in physical activity (Borrego-Balsalobre, Cavas-García, Díaz-Suárez and Martínez-Moreno 2023), and physical activity (PA) is a significant factor in the prevention of childhood obesity (Wyszyńska et al. 2020).

The purpose of this study was to examine the level of physical self-perception (PSP) among lower and upper primary school students in the Physical Education class (PE), and to determine differences in the dimensions of PSP with regard to gender and nutritional status.

Methods

We conducted the study on a sample of 283 participants (134 participants from the 4th grade of primary school (10 ± 6 month) and 149 participants from the 8th grade of primary school (14 ± 6 month)) in Zadar County in Croatia. The research was approved in advance by the Faculty Council of the Department of Teacher and Preschool Teacher Education of the University of Zadar, Croatia. For each participant, the guardian's permission for voluntary participation in the research was requested.

For the purposes of the research, we created an anonymous survey questionnaire, which was completed by fourth- and eighth-grade primary school participants. We aimed the first part of the questionnaire at collecting general data on gender, grade and school and the second part of the questionnaire at examining students' self-perception in the PE class. Items for self-perception were taken from The Physical Self-Description Questionnaire (Marsh, 1996) in Neljak (2013). The questionnaire comprises 47 items and has good metric characteristics (Marsh, 1996). For the implementation of this research, we used only the items for assessment of participants' coordination, sports competence, strength, flexibility and endurance in PE class. We asked the participants to rate their degree of agreement with a particular statement on the Likert scale (I strongly disagree, mostly disagree, not sure, mostly agree, completely agree). Furthermore, for the purposes of the study, we calculated body mass index (BMI) as an indicator of nutritional status and categorized participants by their BMI values into two groups (normal weight and overweight/obese). Categorization was performed according to Cole, Bellizzi, Flegal and Dietz (2004).

We processed the collected data with the Statistica 7.0 program and calculated basic descriptive indicators: arithmetic mean, and standard deviation, as well as response frequencies for individual items. We tested the normality of the distribution by the Kolmogorov-Smirnov test. Since the distributions of all variables deviated significantly from normality, we applied the Mann-Whitney U test to determine statistically significant differences in self-perception dimensions depending on gender and nutritional status. For this purpose, we calculated the median and quartile rank, z-values and significance level (p).

D. Vidaković Samaržija, L. Pavlić Karamatić & J. Alić: Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status

397

Results

We calculated basic descriptive indicators of self-perception dimensions, which are shown in Table 1. Based on the high values of the arithmetic means, it is evident that most participants estimate that in most physical activities they perform movements harmoniously (4th graders 4.56 ± 0. 97 vs. 8th graders 4.14±0.90) and that they easily control their body movements (4th graders 4.54 ± 0. 74 vs. 8th graders 4.39 ± 0.84). Also, most participants estimate that they are good at most sports (4th graders 4.34 ± 0. 96 vs. 8th graders 3.91 ± 1.19). Only 22.53% of participants believe that they are completely stronger than most of their peers, and an arithmetic mean of 4th graders 3.35 ± 1. 29 and 8th graders 3.28 ± 1.25 was determined.

The results showed that participants generally felt that they could lift heavy objects (4th graders 3.89 ± 1. 17 vs. 8th graders 3.90 ± 1.04) and were considered flexible enough for most sports (4th graders 4.16 ± 1. 08 vs. 8th graders 3.71 ± 1.14). Participants generally thought that they could run for a long time without stopping (4th graders 3.80 ± 1. 25 vs. 8th graders 3.36 ± 1.34) and that they could run for a long time without getting tired (4th graders 3.36 ± 1. 37 vs. 8th graders 3.08 ± 1.41). According to the results (Table 1), most participants have a high level of self-perception. More precisely, most participants consider themselves extremely coordinated and flexible, which is evident from the high arithmetic means, and the large share of students who gave the maximum answer. The lowest average values were obtained in the variables by which participants assessed their strength and endurance.

Table 1. Descriptive Parameters (Mean and Standard Deviation) and Response Frequencies to Individual Self-Perception Variables in the Total Sample of Participants

	4th M±SD	8th M±SD	I don't agree at all	Mostly disagree	I'm not sure	Mostly agree	I totally agree
			%	%	%	%	%
In most physical activities, I perform movements harmoniously	4.56±0.79	4.14±0.90	1.02	3.41	10.24	32.76	52.22
I easily control my body movements	4.54±0.74	4.39±0.84	0.68	2.73	6.48	29.69	60.70
I'm good at most sports	4.34±0.96	3.91±1.19	3.07	6.83	16.38	22.53	50.85
I am stronger than most of my peers	3.35±1.29	3.28±1.25	11.26	10.58	35.49	19.79	22.53
I can lift heavy objects	3.89±1.17	3.90±1.04	3.75	6.14	24.23	27.99	37.54
I think I am flexible enough for most sports	4.16±1.08	3.71±1.14	4.44	6.48	21.16	26.96	40.61
I can run for a long time without stopping	3.80±1.25	3.36±1.34	10.72	9.56	21.84	26.28	31.06
I think I could run for a long time without getting tired	3.36±1.37	3.08±1.41	17.41	11.60	25.60	22.18	22.87

We applied the Mann-Whitney U test to define significant differences in the dimensions of PSP with regard to gender (Table 2) and specifically calculated the analysis of differences on subsamples by age.

On a sample of 4th grade participants, we obtained statistically significant differences in two variables. Fourth-grade male participants have significantly better results than female participants in the variables used to assess strength. Male participants rate their strength significantly higher than do female participants (*I am stronger than most of my peers* (Z=3,90; p=0,00); *I can lift heavy objects* (z=3,32; p=0,00)). On the sample of 8th-grade participants, we obtained statistically significant differences in all variables. Male 8th-grade participants rate their coordination, strength, flexibility, sports competences and endurance significantly higher than female participants do.

D. Vidaković Samaržija, L. Pavlić Karamatić & J. Alić: *Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status*

399

Table 2. Differences among Participants in PSP Dimensions Relevant for the Subject of PE by Gender (at the Age Subsamples)

	4th grade				8th grade			
	Male MED (QR)	Female MED (QR)	Z	p	Male MED (QR)	Female MED (QR)	Z	p
In most physical activities, I perform movements harmoniously	5.00/ 1.00	5.00/ 1.00	-1.02	0.31	4.00/ 1.00	4.00/ 2.00	2.62	0.01*
I easily control my body movements	5.00/ 1.00	5.00/ 1.00	-0.91	0.36	5.00/ 1.00	4.00/ 1.00	2.68	0.01*
I'm good at most sports	5.00/ 1.00	5.00/ 1.00	0.55	0.58	5.00/ 1.00	4.00/ 1.00	4.36	0.00*
I am stronger than most of my peers	4.00/ 2.00	3.00/ 2.00	3.90	0.00*	3.00/ 2.00	3.00/ 2.00	3.61	0.00*
I can lift heavy objects	5.00/ 1.00	4.00/ 2.00	3.32	0.00*	5.00/ 1.00	3.00/ 1.00	5.05	0.00*
I think I am flexible enough for most sports	5.00/ 2.00	5.00/ 1.50	-0.30	0.77	4.00/ 2.00	4.00/ 1.00	2.62	0.01*
I can run for a long time without stopping	4.00/ 2.00	4.00/ 2.00	0.97	0.33	4.00/ 2.00	3.00/ 3.00	5.83	0.00*
I think I could run for a long time without getting tired	4.00/ 2.00	3.00/ 2.00	0.79	0.43	4.00/ 2.00	3.00/ 2.00	4.84	0.00*

MED- QR- median-quartile range; Z-z score; p- statistical significance (<0,05)

Table 3 shows the results of the Mann-Whitney U test used to define significant differences in the dimensions of PSP relevant for the subject of PE with regard to nutritional status. We specifically calculated the analysis of differences on subsamples by age.

On the sample of 4th-grade participants, we obtained statistically significant differences in five variables. Normal weight 4th-grade participants rate their coordination (*In most physical activities, I perform movements harmoniously* Z=-3,22; p=0,00; *I easily control my body movements* (Z=-2,49; p<0,01); flexibility (*I think I am flexible enough for most sports* z=-2,49; p<0,01) and endurance (*I can run for a long time without stopping* Z=-2,61; p<0,01; *I think I could run for a long time without getting tired* Z=-2,22; p<0,03) significantly higher than overweight participants. On the sample of 8th-grade participants, we obtained statistically significant differences in two variables.

Overweight 8th-grade participants rate their strength (*I am stronger than most of my peers* Z=2,82; p=0,00; *I can lift heavy objects* Z=3,32; p=0,00) significantly higher than normal weight participants. There were no statistically significant differences in the other variables.

Table 3. Differences among Participants in PSP Dimensions Relevant for the Subject of PE by Nutritional Status (at the Age Subsamples)

	4th grade				8th grade			
	Normal weight	Over-weight			Normal weight	Over-weight		
	MED (QR)	MED (QR)	Z	p	MED (QR)	MED (QR)	Z	p
In most physical activities, I perform movements harmoniously	5.00/ 0.00	4.00/ 1.00	-3.22	0.00*	4.00/ 1.00	5.00/ 1.00	1.18	0.24
I easily control my body movements	5.00/ 1.00	4.00/ 1.00	-2.49	0.01*	5.00/ 1.00	5.00/ 1.00	0.28	0.78
I'm good at most sports	5.00/ 1.00	4.00/ 2.00	-1.86	0.06	4.00/ 2.00	5.00/ 2.00	1.31	0.19
I am stronger than most of my peers	3.00/ 1.00	4.00/ 2.00	1.59	0.11	3.00/ 2.00	4.00/ 2.00	2.82	0.00*
I can lift heavy objects	4.00/ 2.00	4.00/ 2.00	0.78	0.43	4.00/ 2.00	5.00/ 1.00	3.32	0.00*
I think I am flexible enough for most sports	5.00/ 1.00	3.00/ 2.00	-2.49	0.01*	4.00/ 2.00	4.00/ 2.00	0.43	0.66
I can run for a long time without stopping	4.00/ 2.00	3.00/ 1.00	-2.61	0.01*	4.00/ 2.00	3.50/ 2.00	0.01	0.99
I think I could run for a long time without getting tired	4.00/ 3.00	3.00/ 2.00	-2.22	0.03*	3.00/ 2.00	3.00/ 2.00	-0.18	0.85

MED- QR- median-quartile range; Z-z score; p- statistical significance (<0,05)

Discussion

Assessment of one's own abilities gives a significant contribution to the performance of certain motor tasks, but also to general participation in physical activity.

D. Vidaković Samaržija, L. Pavlić Karamatić & J. Alić: Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status

401

Studies have shown that a high level of physical self-perception is positively associated with the motivation for participation in physical activity (Biddle and Wang, 2003; Palacios-Cartagena, Parraca, Mendoza-Muñoz, Pastor-Cisneros, Muñoz-Bermejo and Adsuar, 2022). In addition, a high level of self-perception contributes to the achievement of better results on individual motor tests (Carraro, Scarpa, and Ventura, 2010; Cecić Erpič and Bezjak, 2021).

In this paper we examined individual dimensions of students' self-perception relevant to PE classes. The results showed that most participants rate themselves as sufficiently coordinated, strong, flexible and skilful in performing motor tasks. We obtained significant differences in certain dimensions of self-perception with regard to gender. These results are consistent with other studies that have also found differences in self-perception with respect to gender (Klomsten, Skaalvik and Espnes, 2004; Williams, 2013; Ruiz-Montero et al. 2020). Some authors found that male students have a higher level of self-perception in those dimensions that are socially imposed as more acceptable to a particular gender (Klomsten et al. 2004, according to Beasley and Garn, 2013). With increasing age, the number of items on which students differ by gender with respect to age also increases. In the fourth grade, male students' self-rate their strength significantly better than their female peers do, while in the eighth grade, this difference is significant in all variables. Testing the differences in physical self-perception by age after controlling for gender, the research results of Cecić Erpić and Bezjak (2021) pointed to significant differences in the dependent variables of body fat, strength, flexibility, and global self-esteem. The results of our research indicate that body self-concept significantly decreases with increasing age, especially in girls, which has been confirmed by the results of other studies (Inchley, Kirby and Currie, 2011; Nobre and Valentini, 2019; Navarro-Patón, Pazos-Couto, Rodríguez-Fernández and Arufe-Giraldez, 2020).

The relationship between obesity and physical self-perception, especially in children and young adults, has important implications for physical performance and the systematic implementation of physical activity. Obesity has negative effects on both motor performance and physical self-perception (Morano, Colella, Robazza, Bortoli and Capranica, 2011). In this study we obtained significant differences in the dimensions of self-perception according to nutritional status.

In our study, participants with normal weight gave more positive assessments of their coordination, flexibility, and endurance, while obese participants gave more positive assessments of their strength, a finding which is similar to the research results of Lazarević, Radisavljević Janić, Milanović and Lazarević (2011).

Moreover, in a study by Monacis, Trecroci, Invernizzi and Colella (2022), the results showed significant differences in physical self-perception between normal-weight, overweight, and obese children. In other studies, overweight children have a poorer perception of most of their abilities, but also estimate their strength to be greater (Sung, Yu, So, Lam and Hau 2005). The authors point out that exercise programs for overweight children should be targeted according to better assessed dimensions of self-perception. This would improve the motivation to participate in physical activity. Otherwise, low levels of perceived physical competence, which are common in obese children, may result in less motivation to engage and persist in physical activities, resulting in fewer opportunities to improve their skills and their perception of competence (Stodden et al. 2008).

Numerous authors indicate that children with a higher degree of motor competence and higher self-perception have a higher level of physical activity (De Meester et al. 2016; Jaakkola et al. 2019; Britton, Issartel, Symonds and Belton 2020). The development of motor skills and the acquisition of motor competences during childhood contributes to the formation of experiences related to physical activity, a higher level of physical self-perception, and thus to the maintenance of their physical activity in the future (Loprinzi, Davis and Fu, 2015). A better assessment of physical self-perception increases motivation, commitment, and participation in physical activity (Borrego-Balsalobre et al. 2023) and is a significant predictive factor for their future physical activity (Utesch, Dreiskämper, Naul and Geukes, 2018). Research conducted on a sample of overweight children (Morano et al. 2020), shows that the systematic implementation of a multi-component exercise program can improve the level of PA, fitness and perception of competence among overweight participants. Authors Borrego-Balsalobre et al. (2023) indicate the need for diverse and motivating approaches in physical education classes for students with different nutritional status to acquire commitment to the practice of physical activity and thus to maintain healthy habits throughout life.

There are limitations in this study that could influence the interpretation of the main outcomes. The sample for this research comprised preadolescent and adolescent students who were in the period of maturation accompanied by multiple changes.

D. Vidaković Samaržija, L. Pavlić Karamatić & J. Alić: Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status

403

Maturation processes accompanied by multiple changes are not the same in all individuals, so it can be a confounding factor that needs to be minimized or eliminated in future studies. This is a relatively small sample of respondents from a certain region in Croatia, so the data cannot be extrapolated.

Despite the limitations, the present study contributes to better understanding of changes in physical self-perception according to gender and indicates a decrease in physical self-perception with age. The results of this study indicate risk groups that need strategies aimed to raise the level of PSP and thus to increase participation in physical activity. Low levels of PSP may be an obstacle to engaging in physical activity, so intensive work should be done to increase physical self-perception especially on the sample of female students who stood out as a risk group.

Conclusion

The results of this study indicate that most students make adequate evaluations of certain dimensions of self-perception high. However, comparing the evaluation of individual dimensions that are important for successful performance of motor tasks in PE class, we observed significant differences depending on gender and nutritional status. We also observed that the significant differences were more pronounced with age. In 4th grade, male students report better self-perception only on the dimension of strength, while in 8th grade, male students compared to female students report more positive assessments of all dimensions important for successful performance of motor tasks in PE class. The sample for this research consisted of preadolescent and adolescent students who are in the period of maturation accompanied by multiple changes. This period is also characterized by a decrease in the level of physical activity, so physical self-perception is an important determinant of adolescent physical activity. Strategies for raising the level of PSP should be focused on those dimensions that participants value highly. In this way, there will be no lack of motivation to participate, and a comprehensive approach will contribute to better physical fitness and an improved level of physical activity and will affect the raising of other dimensions of self-perception.

Future research should be aimed at the target group of adolescent students with similar characteristics. It would be desirable to assess the relationship between physical self-perception and the actual assessment of physical fitness.

Also, when assessing physical self-perception, the factors that should be taken into consideration and that could have a significant impact are the curriculum of the PE class as well as the student's previous involvement in sports activities.

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D. Vidaković Samaržija, L. Pavlić Karamatić & J. Alić: Differences in Students' Physical Self-Perception in PE Classes According to Gender and Nutritional Status

407

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GREEK PRIMARY SCHOOL TEACHERS' PROFESSIONAL EXPERIENCE AS DIGITAL ACTORS

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Abstract/Izvleček
The present study investigates teachers' views on their experience as digital actors in the context of Greek educational policy. The interview was used as a tool for data collection. Findings revealed that the teachers in our survey highlighted the shortcomings of the Greek educational approach in terms of material and technical infrastructure and the training of teachers regarding ICT. Through this new digital context of education, teachers conceptualize their competence and self-efficacy, their self-perception, and their emotional response to integrating new digital tools into teaching practice.

Poklicne izkušnje grških osnovnošolskih učiteljev kot digitalnih akterjev
V študiji raziskujemo stališča učiteljev o njihovih izkušnjah v vlogi digitalnih akterjev v grški izobraževalni politiki. Kot orodje za zbiranje podatkov je bil uporabljen intervju. Ugotovitve so pokazale, da so učitelji v naši raziskavi izpostavili pomanjkljivosti grškega izobraževalnega pristopa v smislu materialne in tehnične infrastrukture ter usposabljanja učiteljev glede IKT. Učitelji s tem novim digitalnim kontekstom izobraževanja konceptualizirajo svoje kompetence in samoučinkovitost, dojemanje sebe in čustveni odziv na vključevanje novih digitalnih orodij v pedagoško prakso.

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Introduction

In recent years and since the COVID-19 pandemic, a rapid change in the status of ICT in educational practice has been observed. Educational systems are increasingly investing in new technologies. The fourth industrial revolution, with the automation of production and the development of artificial intelligence, is leading to an ongoing transformation of teaching practice (Schleicher, 2020). Interactions in the learning context deconstruct the traditional contract of face-to-face teaching, and the spatiotemporal classroom boundaries are widening. The appropriation of knowledge is mediated by digital factors (e.g., internet, digital information, etc.), the arbitrary authority of the teacher's dominant figure has long since faded, and learning has moved away from the former objectified form it used to take and is becoming multifaceted as new modes of transforming, organizing, and analysing it have emerged (Pokhrel and Chhetri, 2021; Zhao and Watterston, 2021). The contemporary history of social life dynamically blends the local with the global and symbiotic educational reality with new technology's synchronic or asynchronous digital reality.

Theorists approach digital inequalities and knowledge as forms of power signalling and, simultaneously, as a field of social struggle, control, domination, or negotiation. The possession, access, and usage of technological tools and technological products define a special cultural status and identity, which presupposes the acquisition of digital knowledge and skills and are manifestations of power and relative strength. The new digital reality is how the ideological underpinnings of social reproductive practices document current social arrangements as necessary and justified (Drucker, 1996).

The Teachers' Role in the postmodern era

Postmodern societies rely more on information management and skills specialization than pre-industrial societies (Kelpanidis and Vriniotis, 2004). According to Giddens (2001), the new way of approaching knowledge subverts the traditional mechanisms of knowledge appropriation. The globalized economic context through the power of ICT impacts knowledge and its transformation and the emergence of information as a commoditised product. The production and accessibility of information and its usage have been commodified (Raggneda and Muschert, 2013).

Contemporary capitalism is based more than ever on the distribution of information, and digital networking is creating digital capitalism (Fuchs, 2013). Knowledge takes on multifaceted dimensions, and the new cognitive tool transforms the organization, analysis, and interpretation of knowledge, as well as factors of consideration of sociocultural reality, merging the local with the global (Robins and Webster, 1999). Teachers are proselytized and act as mediators in establishing the dominant socio-political system perpetuating the social inequalities that have emerged in the Information Society (Witte and Mannon, 2010).

In the post-modern educational context, the teacher himself does not determine the educational practices of education (teaching models, curricula, syllabuses, etc.). The teacher has limited autonomy, while educational practices are shaped within the structured framework of the state and the epistemological demands of the contemporary era. It is difficult for teachers to objectify their work as an artefact of their personality and professional identity. Teachers also have difficulty recognizing themselves, their skills, abilities, and creativity, on account of their activity in the new era. At the same time, the colonization of education by the new methodological tools is shaping new conditions for conceptualizing work and the self. Difficulty in determining one's professional and personal identity shapes the borders of others' management within the educational community. Under stress, disembodiment, and the imposition of cultural differentiation by dominant groups in their school life, teachers become alienated from themselves and their relationships with community members (Mesaros, 1974).

All the above imposes much pressure on the teachers and brings up the project of their training. In such an environment of fluidity and change, teachers thus require education and training (Elliot, 1977) adapted to the new social conditions to acquire a higher level of skills, a comprehensive education, and the establishment of a lifelong education (Hargreaves, 1994). The use of ICT on its own does not automatically mean the modernization of a school system. The availability of a specific training policy can contribute to this, which, in the context of a broader educational policy, should promote the teachers' academic, professional, and personal development.

ICT education in Greece

The integration of ICT in Greek education follows the general development of ICT in Greece. In 2014, Greece had not yet captured the full range of benefits from ICT adoption, as it was still lagging behind Europe in 65 out of 84 ICT indicators (77%), based on the European Digital Agenda Scoreboard (2014) (Foundation for Economic and Industrial Research, 2015). However, the Greek ICT sector grew faster than the global ICT sector over the years 2017-2021, especially during the pandemic. According to the Digital Economy and Society Index (DESI), Greece, although it has made much progress in recent years, still ranks among the lowest (25th) in the EU-27 regarding human capital, connectivity, digital technology integration, and digital public services (European Commission, 2022). Fifty-two percent of people (age 16-74) and 88% of young people (16 - 24 years) have at least basic digital skills. There were 8.5 million internet users in Greece in January 2022 and 7.40 million social media users in Greece in January 2022. In Greece, individuals and workers often lack the foundation skills necessary to flourish in a digital world. In Greece, the connectivity gap between households in rural areas and large urban areas exceeds ten percentage points. In Greece, more than one in five households is not connected to the Internet (Organisation for Economic Co-operation and Development, 2019, p. 143). In 2005 the proportion of people with internet skills was 25.2%; in 2007, 36.01%; and in 2013, it reached 62.44% (Eurostat, 2023a). Also, in 2015, 44.01% of individuals had digital skills, and 2019 50.52% (Eurostat, 2023b). In this framework of the Greek educational system, ICT teaching was initially implemented fragmentarily in the 1980s. The Unified Curriculum (YPEPTH, 1998) systematized the introduction of ICT in education, while the *Cross-Thematic Curriculum Framework* (Greek Ministry of Education and Culture, 2003) innovatively aimed at compulsory education to develop digital literacy in students and to familiarise them with the various applications of computers as a learning tool, as a cognitive - exploratory tool and as a tool for communication and retrieving information in the context of daily school activities (Greek Ministry of Education and Culture, 2003). The new 2021 Curricula for informatics are by the Interdisciplinary Unified Curriculum Framework from the first grade to the Lyceum (I.E.P, 2021).

Furthermore, in the past two decades, in Greece, educational training activities for teachers regarding constantly renewing ICTs have been developed by private educational institutions and associations (Hellenic Mathematical Society, Greek Physicists' Union, etc.) and universities. The first training effort in ICT for teachers was conducted through the PEK (Regional Training Centres), which were established in 1992. A great impetus was given by programs funded through the EU. In the initial programs, the emphasis was on knowledge and skills in new technologies (A-level training course, "Training of primary and secondary teachers in the basic skills of Information and Communication Technologies (ICT) in education" (2002-2008). It should have paid more attention to the pedagogical and instructional integration of ICT. Research results on the above have shown that there was a change in the level of knowledge and skills among teachers who attended the programs, and the usage of ICT in teaching practice increased significantly after the training (Jimoyiannis and Komis, 2007). However, support for instructional activities was inadequate (Author, 2011; Komis, 2000), the organization of training programs had considerable problems (Jimoyiannis and Komis, 2007), and doubts were also raised about their effectiveness (Kyridis et al., 2006). At the end of the first decade of the 21st century, a long-term program on the pedagogical usage of ICTs in instruction, as well as training programs for trainers (B-level training course, "Training of teachers in Information and Communication Technologies (ICTs)" 2008-2014) began to be implemented.

Finally, the implementation of "emergency remote education" during the pandemic period and the resulting violent and dynamic change in educational processes revealed several aspects related to the digital literacy of teachers, such as a) teacher confusion and stress (Koutsogiannis, 2020, p. 550; UNESCO, 2020), and their lack of training (KE.ME.TE, 2021; Perifanou et al., 2022; Samioti, 2021); b) the social and digital inequalities that digital technology causes in both teachers and students (Author, 2020; Ralli, 2021), and c) the reflection on the transformation of the role of teachers and in the methodology of teaching practice (Author, 2020; Jimoyiannis et al., 2020). The integration of ICT in Greece during the COVID-19 period revealed barriers to its implementation and the direction in which educational policies should be oriented. Two of the most significant issues, upgrading the logistical infrastructure and teacher training, have not yet been addressed.

The present study investigates teachers' views on their experience as digital actors in the context of Greek educational policy. Research questions included how teachers experience themselves as digital actors and evaluate Greek educational policies on ICT use.

Method

Qualitative research was used. Qualitative research involves a naturalistic and interpretive approach to social phenomena, in their natural context, through the discourse of individuals and their interpretive schemas (Denzin and Lincoln, 2005). In addition, qualitative research approaches social phenomena by conceptualizing the acting subjects and their social action as a complex symbolic construction adopting reflection processes (Tsiolis, 2014). A phenomenological approach was chosen in the context of qualitative research in which the common conceptualizations of individuals of their lived experience regarding the phenomenon under study are captured. The phenomenological approach enables the researcher to identify and interpret the phenomenon's essence. The participants selected all had experience related to ICT implementation in Greek education and wanted to record their views in the research (Creswell, 2013; Denzin and Lincoln, 2005).

Participants
This study used the qualitative method to assess the participants' interpretations and social experiences. Participants were selected to ensure the appropriateness and adequacy of responses to the research questions (Iosifidis, 2017). Purposive sampling was used, and two strategies were followed: a) selecting those critical cases that are experts in the field of our research and b) ensuring maximum sample diversity (gender, age, years of service) (Flick, 2017). In total, 29 primary school teachers were selected, ten males and 19 females of several age groups. Participants' age ranged from 32 years old to 54 years old, with an average of about 41.5 years. Years of service were between 1 and 36 years, with an average of 13.5 years.

Table 1. Demographic Profile of Participants

Years of service		Age		Primary Education category	
1-5 years	7	30-40 years old	14	PE70	23
6-15 years	8	40-50 years old	12	PE11	3
16-25 years	8	50 years and over	3	PE06	3
26 years and over	6				
				Work Position	
Area				Typical class	16
Urban	17			Educational Priority Zones	2
Countryside	9			Integration class/Parallel support	5

Research Implement

For the present study, we used interviews for data collection and, more specifically, the semi-structured interview, characterized by a looser question structure. This is a qualitative research tool that aims to organize a communicative relationship between the interviewer and the interviewee, for the former to obtain information from the latter through appropriate questions (Iosifidis, 2017). The interview guide included four thematic axes:

- The first thematic area concerned teachers' conceptualizations regarding the digital divide. Indicative questions were: "What does the digital divide mean to you?", "Can you give us an example of a digital divide through your experience in school?".
- The second thematic area was related to the causes of the digital divide. Indicative questions were: "What are the causes of the digital divide?", "What explanation do you give for the existence of the digital divide in education?"
- The third thematic area referred to the consequences of the digital divide. Indicative questions were: "What do you think are the consequences of the digital divide in your daily life?", "What do you think are the consequences of the digital divide in your instructional work?", "Who is most affected by the digital divide in the school context?"
- The fourth thematic area included questions about ways to address the digital divide. Indicative questions were: "In your opinion, to address the digital divide, what can you personally do?", "In your opinion, what can the education system do to address the digital divide?

Research procedure

In the present study, we chose the thematic analysis method to analyse the information from the interviews with teachers. Essentially, this is a method that identifies patterns within the data allowing the researcher to understand the research data in depth. Thematic analysis is valuable for studying data collected from open-ended research questions such as focus group discussions or interviews. In this research, coding was carried out after the data was collected through semi-structured interviews. Coding is a technique for identifying themes and concepts in the text and finding relationships between them. The central unit of analysis was sentences, paragraphs, or the whole interview text (Kyriazi, 2009, p. 238). In addition, coding was guided by concepts drawn from existing literature and theory. The next step was categorizing the data into multiple categories and sometimes subcategories. In the end, the processing of existing ideas and concepts was conducted.

Results

In the present study's findings, teachers' views on their experiences as digital actors are presented. Teachers' views are related to intrapersonal and interpersonal dimensions of their experience and the educational policies implemented during the integration of ICT in the Greek educational system.

Teachers' experience as digital actors (Intrapersonal and interpersonal dimensions)

- Positive Teacher experiences

Most teachers in our survey mention the positive effects of digital literacy on teaching practices. Digital literacy, according to these teachers, facilitates the learning practices and the instructors' actions and fosters an emotionally positive climate based on cooperation and emotional closeness between student and teacher. In addition, ICT supports the development of a network of information on educational work between schools.

Facilitate educational activities: *"Those who are familiar with using... They have collected supervisory material and not only their own, but they have the supervisory material of many teachers;" "... it is easy for me, who knows to search about the first flight into space...I can easily be ready in two minutes" (E3).*

Use of different teaching methods: *"I think a teacher working with technology can teach the same thing in various ways, with many comparisons..." (E8).*

Engagement - learner agency: *"With new technologies, students can be more engaged... you do not provide them with information that is, let us say, 'sterile;' they work on their own doing what they want to do, they feel more productive..."* (E12)

Increased emotional closeness with the teacher: *"And they feel closer to the teacher...the lesson becomes more pleasant, more immediate with the students, they feel more comfortable and relaxed, you interact better with each other"* (E1).

Developing an information network between schools: *"...you can communicate with other schools in Greece about the same subjects and how they teach them, to provide the children with additional information"* (E17).

-    Negative teacher experiences

Nevertheless, some teachers have negative professional experiences as digital actors. For example, they feel undervalued or threatened and have feelings of burnout or feelings of knowledge inadequacy.

Underestimation: *"... Those who can use it are considered better. The others feel inferior, feel disadvantaged. I could place it in that way"* (E20)2.

Threat*: "I am threatened in some way on a daily basis. Because while I have some basic knowledge about technology, this constant growth is scary..."* (E143).

Emotional burnout*: "...apart from the fact that it is exhausting, and you do not have the patience, neither can I afford to follow it, nor do I have the time to deal with new technologies all the time"* (E7).

Feelings of knowledge inadequacy*: "Yes indeed, I feel that I should be able to learn some things; I lack skills, and I would only want to be trained to learn how to operate laptops, projectors..."* (E22).

Digital technology also harms people's social networking in terms of communication because of a lack of appropriate equipment or skills and their relationships with others, which can turn into dependent relationships.

Communication: *"In my everyday life... I think it has affected me most in the communication field. As some friends of mine do not have certain applications that I have or do not have the knowledge to use them"* (E28).

Interpersonal relations*: "... it can also affect relations with colleagues. Of course, it can have an impact…"* (E10).

Dependency on others*: "I find it quite difficult. I can be familiar with new technology and be a little independent regarding computers and not depending on other colleagues, to whom you become a burden"* (E4).

According to the teachers in our study, negative professional experiences are related to the insufficient utilization of ICTs in teaching practice, as a result of inadequate skills or inferior logistical equipment. In addition, teachers mentioned that professional inequalities are increasing as a result of a deficit in the necessary skills, and there is the stigmatization of schools that cannot use ICT.

Low usage of ICT in classroom practice: *"Regarding teachers, some of them may not use digital media so often to support their teaching practice" (E25).*

Negative consequences for students due to teacher inefficiency: *"I think students experience a learning disadvantage if the teacher does not know something to demonstrate to them ... the stimuli teachers provide may be less" (E2).*

Establishing a professional divide: *"... anyone who does not comply will be left behind ... that is, the one who does not have an internet connection and a computer is left behind" (E21).*

Education Policy on ICT Digital

Teachers reported outdated ICT resources in schools, which can malfunction. Usually, the Ministry of Education offers limited funding, which is insufficient for a fully equipped school, and the level of flexibility in the usage of ICT depends on the school's culture.

"Uh... okay… There are some worthy efforts to have the appropriate infrastructure available. However, unfortunately, school facilities are deplorable regarding infrastructure; there are schools with few labs or even no computers. Without interactive whiteboards even. I think there should be better material infrastructure, and every class should have its proper computer and projector" (E16).

"My difficulty is the infrastructure that does not exist in several schools to use the new technologies properly as I know how ... I do not feel that I can search; there is no electronic 'library' ..." (E19).

"We are privileged as a school compared to other schools I hear about since we have three interactive whiteboards" (E24).

State support is insufficient regarding equipment and teacher training, resulting in negative feelings concerning this issue. Teachers referred to the failure of the State to develop teachers' digital skills training at an adequate level. In-service training in Greece needs to be improved or extended. Teachers are often forced to join training programs on their initiative and at their own expense to cope with the new cognitive challenges of ICT.

"Training is not at all encouraging, and it depends on the teachers and their willingness to offer as well as their knowledge" (E11).

"I think training is not enough; I was trained too, but there were so many things I had to learn that maybe I could not sufficiently assimilate them as to feel secure" (E14).

"... for example, ICT training has stopped being provided. They only conduct exams, and as far as I know, these are administered in large testing centres located off-island" (E8).

Discussion

Teachers' life experiences in their professional careers and encounters as individuals with the differentiation of teaching practices and the postmodern context contribute to forming their identity as teachers (Hargreaves and Goodson, 2006). The present study investigated teachers' views on their experience as digital actors in the context of Greek educational policy.

Teachers in our survey mentioned both positive and negative aspects of their interaction with ICT. The positive reports from the group of teachers in our survey concerned pedagogical practices, since ICT facilitates instructional practice, and teachers' actions and forms an emotionally positive climate based on collaboration and student-teacher emotional closeness. In addition, ICT supports the development of a network of information on learning and teaching between schools. Studies have highlighted the above aspects of ICT's positive effects (Diamantaki et al., 2001; Gulbahar and Guven, 2008; Jimoyiannis and Komis, 2006; Jonassen et al., 1998; Kafai et al., 2002; Kyridis et al., 2003; Rumpagaporn and Darmawan, 2007). Moreover, many teachers had negative learning experiences as digital actors. They felt undervalued or threatened and had feelings of burnout or feelings of knowledge inadequacy. According to the teachers in our study, negative professional experiences were related to the low usage of ICT in teaching practices due to inadequate skills or lack of logistical equipment. Teachers mentioned that professional inequalities are growing on account of the lack of necessary skills, while there is a stigmatization of schools that cannot use ICT. Digital technology also harms people's social networking in terms of communication because of a lack of appropriate equipment or skills and their relationships with others, which can also turn into dependent relationships. Dysphoric states (e.g., anxiety, fear) have been confirmed in several studies (Demetriadis, 2003; Pelgrum, 2001; Preston et al., 2000; Vosniadou, 2006).

To deal with these issues, an effective education policy would be necessary. Teachers in our survey stated that educational policy in Greece for ICT integration in schools is inadequate or insufficient because of limited State funding, inadequate training, and the inappropriate culture of some schools.

State support needs to be improved in terms of financial support for the digital upgrading of schools and in the training of teachers, since the present situation has resulted in an unfavourable climate around the issue. In-service training in Greece is limited and needs to be improved. Teachers are often directed to join training programs on their initiative and at their own financial expense to cope with the demands of contemporary education.

The new cognitive tools of the postmodern era shape the different accessibility of teachers to learning resources and individuals derived professional experiences, making ICTs part of the interest conflicts between social groups (Giddens, 2001). The 'colonization' of education by new methodological tools alienates aspects of the teacher's experience of learning, such as their relationship with knowledge, their educational practice, their relationships with members of the educational community, and their relationship with themselves. Their differentiated views result from their professional trajectory in the postmodern and digital context. The social differentiation in subsystems that is taking place is a dynamic and continuous process that transforms social structures into new levels of social inequality, which have the management of new cognitive tools as a fundamental component (Giannakopoulos, 2005, p. 37), along with the manipulation and exclusion of individuals and groups (Melucci, 2002). Thus, the availability of digital resources establishes a new level of social stratification and new forms of inequality. Inequality and social classes are not approached materialistically but as unequal access to digital literacy. Digital inequalities and knowledge are perceived as both forms of power signalling and, simultaneously, as a field of social struggle, imposition, domination, or negotiation. As a mediating framework in teachers' pedagogical experience, the Greek educational policy function raises issues of the reproduction of social inequalities, which have been transformed into digital disparities. The school's orientation is also determined by digitally dominant social groups, which can impose ideological and educational policy agendas as another form of symbolic violence. Simultaneously, the public area of education, with its conditions of underfunding and insufficient teacher training, operates as a part of a commercialized education by reducing the availability of public resources, subverting the social contract of public free education, and pushing teachers to join private training organizations. The instrumentalization of the production process, the commodification of knowledge, and the increasing influence of market practices in education are among the inevitable consequences emerging in this context.

Conclusion

Overall, the teachers in our survey highlighted the shortcomings of Greek educational policy in terms of material and technical infrastructure and the training of teachers regarding ICT. The educational environment that is formed shapes the teachers' professional experience regarding the use and usefulness of ICT at Greek schools. Through this new digital context of education, teachers conceptualize their competence and self-efficacy, their perception of themselves, and their emotional response to integrating new digital tools into teaching practice. There is, therefore, an educational project to build a functional framework for introducing ICT in education that aligns with the latest cognitive tools provided in the post-modern era. At the same time, increased funding is deemed necessary to upgrade the quality of the material and technical infrastructure and train teachers in ICT.

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Digital Devices and Interpersonal Communication Over Time

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Abstract/Izvleček

Digital communication supported by mobile devices has an essential impact on interpersonal relations. Face-to-face communication is significantly affected because of the habits of simultaneous use of mobile devices and digital communication. The effect on interpersonal relations is negative since the behaviour affects personal closeness, empathy, and trust, including the feeling that a physically present person is unwanted or redundant, even replacing face-to-face communication with text messaging. The behavioural patterns significantly change if a loved one is involved. Results show that behaviour patterns did not change considerably over five years. Simultaneous digital communication, replacing face-to-face contact or voice call with text messaging is still present, with minor deviations in the post-pandemic period. Nevertheless, personal contact with beloved persons is still the primary preference over time compared to digital contact.

Digitalne naprave in medosebna komunikacija skozi čas

Digitalna komunikacija, podprta z mobilnimi napravami, pomembno vpliva na medsebojne odnose. Kadar oseba hkrati uporablja mobilno napravo in digitalno komunicira, je medosebna komunikacija zelo omejena in negativno vpliva na medosebne odnose. Tako vedenje vpliva na osebno bližino, empatijo in zaupanje, vključno z občutkom, da je fizično prisotna oseba nezaželena ali odveč. Vedenjski vzorci pa se bistveno spremenijo, ko je prisotna ljubljena oseba. Rezultati kažejo, da se vedenjski vzorci v petih letih niso bistveno spremenili. Še vedno sta prisotna sočasna digitalna komunikacija in nadomeščanje medosebnega stika ali klica s tekstovnim sporočanjem, z manjšim odstopanjem v obdobju po pandemiji, ki kažeta željo po več osebnih stikih. Osebni stik z ljubljenimi osebami namesto digitalnega je še vedno primarna izbira.

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Introduction

It is impossible to imagine life without digital communication via the Internet, which is supported by various technical devices. Until recently, the mobile phone was the most commonly used device for interpersonal communication involving voice calls. Nowadays, voice calls are not necessarily made exclusively by mobile phones, so the term 'mobile phone' has been replaced by 'mobile device'. Calls in any form are increasingly made via portable or wearable devices. Therefore, in our article, we use the term mobile device(s) instead of mobile phone unless it is necessary to refer to the latter device specifically. Younger generations become owners of mobile devices even before the start of formal education. As a result, the software on these devices and the influence of practically constant use have significantly changed the way of communication and lifestyle. (Matijević and Topolovćan, 2019)

Digital and interpersonal communication

As a result of lifestyle changes, certain behavioural patterns have also arisen. We mean the way interpersonal communication has been transformed from the traditional face-to-face kind to other parallel forms. Text messages, social networks, and other applications on mobile devices are in use as intermediaries. In this way, the frequency of face-to-face communication is decreasing and is being replaced by these other forms. Moreover, the Internet and especially social media, have evolved into a new format for socialization and a means of interpersonal communication (Blažević and Klein, 2022). The phenomenon particularly intensified during the pandemic. Replacing face-to-face communication with digital increased even when contacts were not officially restricted. Eighty-six percent of participants in a survey on the use frequency of both communication methods during the pandemic period in several countries confirmed the replacement of face-to-face communication with digital communication. This was done equally by women and men. However, women used video communication more often. Regarding age, younger people (up to 36 years) preferred digital communication, while older people communicated more often by voice call (Newson, et al., 2021).

The absence of direct interpersonal communication lowers the quality of relationships, and other negative consequences are also noticeable. Those include the decline of reading literacy, in the quality of messages and in the content.

Research shows that we cannot neglect the importance of face-to-face communication. People perceive face-to-face interactions as more valuable or meaningful, enabling better social connections and emotional closeness than digital communication like text messages, e-mail, social media, etc. Digital communication generates the absence of nonverbal cues, such as facial expressions, body language, tone of voice, and eye contact, which convey emotions and intentions (Nguyen, et al., 2022).

On the other hand, digital or computer-mediated communication allows interpersonal connection when someone is not physically present for various reasons. The benefits are closely dependent on the ways digital communication is used (Newson, et al., 2021). According to Liu (2019), text-based messaging brings positive associations with psychological well-being, while gaming brings negative associations.

The value of face-to-face communication in interpersonal relationships is unquestionable. Of course, we cannot pay attention to this alone. Digital communication is practical, enabling connection, constant communication, and availability. Our research focuses on interpersonal relationships and the simultaneous use of digital communication, mainly from the perspective of teacher education since our students, as pre-service teachers, will teach children in the near future, and many of them already display such behavioural patterns.

Many mobile device owners admit to using them during various social activities, including face-to-face communication. Such behaviour causes unfavourable feelings for the person involved. This kind of behaviour affects personal closeness, empathy, and trust. Affected persons feel that a virtual person is more important than a physically present person. The oddest situation, according to Štrukelj (2017) is the use of a mobile device even during sexual intercourse, which has a directly negative impact on relationships. All such behaviour patterns can, without exception, be classified as the Phubbing phenomenon. Phubbing means ignoring the present person in favour of a mobile device, thus harming the relationship.

In most cases, phubbing is present among closely related persons, and among partners, it often causes jealousy (Al-Saggaf and O'Donnell, 2019). Phubbing has become increasingly common since mobile devices have been around to play a significant role. It often happens when individuals are engaged in face-to-face conversations, social gatherings, or other interpersonal situations.

When someone participates in phubbing, they may constantly check their phone, browse social media, send text messages, or engage in other digital activities instead of being fully present in the conversation or the moment. This behaviour can be seen as disrespectful and negatively affect interpersonal relationships. Phubbing can lead to feelings of exclusion, frustration, and decreased social connection for the person being ignored. (Chotpitayasunondh and Douglas, 2018). It conveys that the person's presence or conversation is less important than digital distractions. Over time, repeated phubbing can erode trust and intimacy in relationships and hinder effective communication.

Multicommunication

The simultaneous use of mobile devices and digital communication negatively impacts interpersonal relations. However, when more people are involved for some reason, multiple forms of communication can confer benefits, for example, if group interaction is required or desired during organizational sessions or meetings. The group members can simultaneously interact through text messaging in any form and or face-to-face interaction. However, this solution or possibility is not always welcome and is considered distractive. Some researchers classify this under the term multitasking, which is a practice mainly attributed to younger people. More descriptively, the concept of simultaneous communication can be described by the term multicommunication, which supports effectiveness, participation, and task orientation (Paskewitz and Beck, 2019). We believe that the concept is suitable for corporate activities, but less so or not at all, from the point of view of interpersonal relations and education.

Text messaging as digital communication and education

We must recognize the concerns that text messaging, as an integral part of digital communication, leads to decreased writing quality. Some research also suggests a decline in reading literacy and in the quality of message writing as side effects, primarily of text messaging. All this is mainly due to emoticons, which replace words and enable a shortcut past grammatically correct notation. Some studies suggest that emoticons enhance expressivity in communication, and people may even perceive messages without these as rude (Sanpietro, 2020).

The survey about the grammar of emoji shows that textual communication with emoticons does not involve grammatical complexity (Cohn, Engelen, and Schilperoord, 2019). We have no absolute confirmation of this, as opinions change over time. In the period before the pandemic, the view prevailed that the effects were negative, but according to other research results, the impact of text messaging on literacy does vary. Some studies have found a positive correlation between texting and literacy, while others have found negative or non-significant correlations. One example of such a negative impact is the finding that points to the fact that students who use text messaging need more time to complete a reading task or may feel sleepy during the daytime (Yilmazsoy, Kahraman, and Köse, 2020).

On the other hand, a summary of research (Using texting to promote learning and literacy, 2014) on the impact of text messaging shows the positive role of its use for building foundational reading skills and encouraging the participation of students with learning disabilities or those who have difficulty engaging in discussions or do not feel confident about participating in class discussion. Even in persons with dyslexia, establishing a positive relationship with reading ability may result. The analysis of more than five hundred text messages showed creative, communicative ability without affecting the quality of language expression. Most existing research is conducted on younger children from the upper grades of primary and secondary schools. Therefore, the researchers emphasize that the focus in the future should be on the impact of text communication in connection with formal academic language, which lies more in the domain of older adolescents.

Regardless of the divergent findings, we believe choosing between the beneficial effects and the excessive use of digital communication, especially in education, is necessary. Constant changes in findings are evident regarding the analysis of teachers' views on the reception ability of younger students after emergency remote teaching. The results show moderate and significant differences in receptive skills (Kerneža, 2023). Although this fact is not directly related to the consequences of excessive digital/text communication, it somehow belongs in the context of digital communication. In general, text communication, as part of digital communication, does not affect reading literacy and understanding of messages among older adolescents.

Methodology

Purpose

The research aims to identify changes in social behaviour involving the use of mobile devices over the years. We paid extra attention to the differences before and after the pandemic. The research focused on social interaction between two persons and on interaction between the person and a group of persons.

The following research questions were posed:

- Have there been any changes in the time students spend on digital communication per day?
- Have there been any changes in the time students spend using mobile phones per day?
- Has behaviour involving simultaneous use of mobile devices during in-person contact changed over time?
- Has the behaviour of simultaneous digital communication during contact with single or several people changed over time?
- Has there been any change in the preferred type of digital communication with a beloved person over time?
- Has the usage of textual messages instead of voice calls changed over time?

Sample

The sample includes 417 pre-service teachers (hereafter, students) of Elementary Education and Preschool Education at the Faculty of Education in Maribor and students of Pedagogy at the Faculty of Arts in Maribor. These students were attending the first year of study in the academic years 2018/19 (185 students), 2021/22 (101 students), and 2022/23 (131 students). The survey does not include the 2020/21 academic year because of the pandemic. The average age of the students is 20 years. The structure of the sample by study program shows Table 1.

Table 1. Students in the sample by academic year

	Frequency	Percentage
2018/19	185	44.4
2021/22	101	24.2
2022/23	131	31.4
Total	417	100.0

Data collection

Data were collected by questionnaire using the online surveying tool. To exclude the eventual effect of novice students' uncertainty, they received the questionnaires in the summer semester, which we found to be a reasonable time for adaptation. The data were processed using SPSS statistical software, using the statistical methods of descriptive statistics, chi-square test, ANOVA, and selected non-parametric tests for analysis of the rating scales.

Results

Digital communication per day

Communication and digital communication in particular are a necessity and a daily routine, whether in the desire for information or for assigning tasks or assignments. The students estimated the time spent on digital communication per day. The results in the Table 2 show the average time spent on digital communication over time, considering all communication tools such as social media, e-mail, messaging applications, etc. Only valid responses are analysed.

Table 2. Digital communication per day (in hours) by academic year

Academic year	N	Mean	SD	F
2018/19	185	4.23	2.775	
2021/22	101	3.46	2.390	2,929*
2022/23	131	3.63	2.631	
Total	396	3.75	2.411	

*$p < 0.05$, df=2

The average time spent on digital communication is between 3 and 4 hours daily. Compared to the academic year 2018/19, the amount of time has decreased. According to the general opinion that more communication is being conducted digitally, this result is unexpected. We estimate that the most reliable reason is that it is difficult to correctly estimate the time spent on it, given the multitude of digital communication forms. The results also show the least time spent on digital communication being during the pandemic, when in-person interactions were limited. It is somehow surprising, since researchers discovered that direct, in-person interactions during the pandemic and after were replaced by digital communication (Skalacka and Pajestka, 2021). In our opinion, the reason is that digital communication plays more of a supportive role and less the role of a replacement for in-person interaction. We should investigate this phenomenon in the future.

Daily use of mobile phones

In terms of their functionality, mobile phones serve more as multifunctional communication devices than telephones exclusively. Despite being aware of this, we ask students to estimate the daily time spent on ordinary phone calls. The results in Table 3 show the average time for phone calls. Only valid responses are analysed.

Table 3. Table: Average daily use of mobile phones in hours by academic year

Academic year	N	Mean	SD	F
2018/19	180	4.21	2.799	
2021/22	94	3.02	1.760	
2022/23	38	3.63	2.066	8.008*
Total	396	3.75	2.411	

$*p<0,05$, df=2

The students report spending between 3 and 4 hours daily making phone calls. This time has decreased, reaching the lowest level during the pandemic, after which it increased again. The lowest average time spent making regular phone calls corresponds with the findings shown in the Table 3, which emphasizes other forms of digital communication. During the pandemic, the amount of time expended on digital communication via messaging, social media, and e-mail increased at the expense of regular phone calls (Nguyen, et al., 2020). The decreased time spent on phone calls agrees with these findings.

Despite this, there is a specific reservation about the results because using mobile phones to facilitate a variety of digital communication media can make it difficult for students to accurately estimate the usage time for one particular form of digital communication. In this case, we are only talking about normal phone calls, not any type of voice calls over a broadband internet connection or, more technically correct, Voice Over Internet Protocol (VoIP). Nevertheless, the results are interesting and provide an answer to the research question posed.

Interpersonal behaviour over time

Recently, many experts on social and society relations, including technology gurus, have pointed to problems in establishing quality interpersonal relationships due to inappropriate and simultaneous use of ICT during meetings. The problem is that people find face-to-face interactions more meaningful and useful for building social relationships and emotional closeness (Nguyen, et al., 2022). Being aware of those facts, we expect changes in behaviour involving simultaneous use of mobile devices during in-person contact and analyse the answers from the past three academic years. The focus is on simultaneous digital communication during face-to-face contact with another person or several persons.

Our observations show that the habit of simultaneous digital communication during face-to-face contact is widespread, regardless of whether one or more persons is involved. The analysis by the Kruskall-Wallis test in the Table 4 presents the state of this habit over time.

Table 4. Simultaneous digital communication during face-to-face contact by academic year

	Academic year	N	Mean Rank	p
Simultaneous digital communication during face-to-face contact with several persons	2018/19	185	210,32	0.196
	2021/22	94	186,01	
	2022/23	123	200,08	
	Total	402		
Simultaneous digital communication during face-to-face contact with one person	2018/19	185	213,15	0.120
	2021/22	94	192,10	
	2022/23	123	191,17	
	Total	402		

Whether one or more persons is involved in face-to-face communication, the habit of simultaneous communication remains the same over time.

The observed differences between the academic years are not statistically significant (p>0.05). The outcome is not encouraging, considering that paying full attention to the person(s) to whom we are talking is more appropriate. More detailed analysis indicates that this is not such a poor outcome as it appears at first glance. The results in Table 5 suggest that the most frequently chosen options in academic years and, regardless of the number of persons involved, are "rarely" and "occasionally". Such an outcome is better than we could have inferred from the results in the previous tables, but such behaviour is very common.

Table 5. Habits in digital communication during face-to-face contacts by academic year

Simultaneous digital communication during face-to-face contact with several persons			
	2018/19	2021/22	2022/23
	%	%	%
Never	4.3	3.2	4.9
Rarely	36.2	51.1	43.1
Occasionally	49.2	37.2	39.0
Very often	10.3	8.5	13.0
Total	100.0	100.0	100.0
Simultaneous digital communication during face-to-face contact with one person			
	2018/19	2021/22	2022/23
	%	%	%
Never	13.5	14.9	17.9
Rarely	50.8	60.6	56.1
Occasionally	32.4	22.3	22.8
Very often	3.2	2.1	3.2
Total	100.0	100,0	100.0

Less than 5% of students never e-communicate simultaneously in the presence of more than one person. On the other hand, when just one person is present, this is a common habit in between 13% and 18% of cases. This indicates an attitude of greater politeness towards a single person than towards multiple persons.

But there are still too many cases of simultaneous digital communication during face-to-face contact, regardless of the number of persons involved and academic year. In total, more than 80% of students in every academic year simultaneously e-communicate rarely or occasionally during face-to-face contact, regardless of how many persons are involved. Such a situation is bad and indicates worsening interpersonal respect and relationships. We believe that this requires in-depth sociological analysis.

Preferred type of digital communication with a beloved person over time

The previous analysis reveals the behaviour in interpersonal communication when fewer affiliated persons are involved. When communicating with a loved one, a different attitude can be expected, mainly because contact and communication among beloved persons are more personally oriented and feature closer personal interaction. Communication via social media, messenger apps, or simple text messaging options is meant under the electronic communication option. The results in Table 6 show communication preferences over time.

Table 6. Preferences in communication with a beloved person

	Academic year		
Preferred way of communication	2018/19	2021/22	2022/23
Preferably electronically	1 (0.5%)	4 (4.3%)	2(1.6%)
Preferably in person	110 (59.5%)	59 (63.4%)	69 (56.1%)
Both ways equally	14 (7.6%)	6 (6.5%)	12 (9.8%)
Adapt communication to the needs or	60 (32.4%)	24 (25.8%)	40 (32.5%)
Total			

$\chi^2=6,920$, df=6, p>.05 Numbers in parentheses indicate column percentages.

The results regarding the findings of simultaneous digital communication during face-to-face contact are significantly more favourable. The preference for maintaining personal connection prevails, regardless of the academic year, followed by adaptation when required by circumstances. Nearly 60% of students prefer personal contact with a beloved person rather than digital communication. This share remains constant over time.

A slight increase is noticeable for the academic year 2021/22, which we consider to be the consequence of the post-pandemic period and the re-establishment of personal contacts. Considering the modern trend towards full-time work, the need to periodically adjust contact options is understandable, and almost a third making this choice is not a bad result. However, a lower share appears again in the academic year 2021/21, owing to the re-establishment of personal contacts after pandemic restrictions and the desire for closer connections. The proportion of students communicating with a loved one exclusively electronically is negligible, again with a minor increase in the post-pandemic period. However, a relatively uniform share of those who are equally likely to communicate in person and electronically is noticeable throughout the years. In these cases, we believe it is about people with a specific social deficit, anxiety, or difficulty establishing relationships with others.

Messaging instead of voice conversation

Changing patterns of social behaviour lead to more frequent use of communication services like text messaging, multimedia messages, or social media to avoid voice conversation. The five-level scale was used to estimate the extent of the habit of using messaging services instead of voice conversation. The scale range is from never to always.

Table 7. Using messages instead of voice calling

	Academic year		
	2018/19	2021/22	2022/23
Rarely	24 (13.0%)	21 (22.6%)	12 (9.8%)
Occasionally	60 (32.4%)	31 (33.3%)	39 (31.7%)
Very often	91 (49.2%)	34 (36.6%)	60 (48.8%)
Always	10 (5.4%)	7 (7.5%)	12 (9.8%)

$\chi^2=10.901$, df=6, p>.05

The results in Table 7 show that nearly 50% of students often replace voice calls by sending messages, and about a third do this occasionally. Outcomes do not change significantly over time. Given that the options of 'occasionally' and 'often' avoiding voice conversation together amounted to approximately 80%, the phenomenon of avoiding voice conversation is apparently widespread.

According to the findings of previous studies, we assume that the reasons may vary, from avoiding direct conversation or having direct personal contact only when necessary, to other personal reasons. Students did not want to explain the reasons behind or purpose for such a decision. Again, we are dealing with a relatively uniform share of less than 10% of those who continually avoid voice calls by sending messages. A specific social deficit is the most likely reason. The least frequent occurrence of this phenomenon was observed in the academic year 2021/22, which could be related to the post-pandemic situation and the desire for closer contact. In general, the results of such behaviour are many short messages, often with very lax grammatical correctness.

Based on our experience working with the students, mail or text messages have many typos, lack polite phrases, and indicate poor understanding of instructions. This is particularly true for the inability to read a higher amount of textual content when instructions require this, as in the case of instructions for seminar assignments, rules for attending tutorials, and exams, along with other study obligations. Research in Canada, for example, points to a negative correlation with spelling (Grace, Kemp, Martin, and Parrila, 2014). Conversely, the traditional belief that text messaging influences reading literacy is not confirmed. A correlational, quantitative study among youngsters (Zebroff and Kaufman, 2017) showed that text messaging is not significantly associated with literacy.

Discussion

The behaviour patterns of young people when using digital communication did not change significantly over five years. There is variation only in some results related to the post-pandemic period, when the desire for more personal contacts increased slightly. However, the differences are not statistically significant compared to the previous years and last year. The time spent on digital communication is mostly constant and is estimated at just under 4 hours. Phone usage time is similarly assessed as for other kinds of digital communication. However, we are aware that the amount of time for a typical telephone conversation and the time for an equivalent type of communication in the form of VoIP when using applications are challenging to separate and assess with accuracy. Simultaneous digital and face-to-face communication is almost the norm, regardless of whether one or more people are involved.

We can easily classify this as Phubbing, which exerts a relatively strong effect on the relationship with the affected person. There is even slightly more simultaneous digital communication when only one person is involved. However, behaviour changes significantly when it comes to communication with a loved one. In such cases, interpersonal or direct communication prevails. Owing to a variety of current influences, such as all-day work, business trips, etc., the combination of face-to-face and digital communication is also desirable for maintaining contact with a loved one. The habit of writing text messages instead of voice calls is widespread. This habit shows that young people often want to avoid direct conversation and prefer the indirect option. Preferring indirect to direct conversation is a peculiar sociological phenomenon. Frequent or even excessive writing of text messages causes a flood of short and mostly grammatically or content-deficient messages, often replacing verbal expression with emoticons.

Despite the research findings not having shown a connection between text messaging and reading literacy, when working with students, we do notice a lower ability to read and understand more extensive textual content. This fact is most evident when reading teacher or administrative notices, whether electronic or printed. These communications are often poorly understood or processed without the essentials. The results also show that about 10% of students want only digital communication, which is not the most encouraging news for future teachers. The present research findings provide new directions in observing the effects of digital communication tools on interpersonal relationships. Insight and knowledge will benefit teachers and parents of children and the work of counsellors. Nevertheless, work on this topic is a constant need and challenge in the future.

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VIDEO IN BLENDED TEACHER EDUCATION: A TOOL FOR PRACTICING TEACHING ANALYSIS

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Abstract/Izvleček
The article presents a case study of using videos to develop primary school student teachers' skills when analysing teaching. It is based on a content analysis of teaching observations, students' written work, teacher feedback, curriculum, student evaluation, and teacher interviews. The research results show that using video is meaningful and motivating to student and university teachers. However, students rarely draw on theoretical knowledge in analysing the situations. To connect theory and practice, it is desirable to consistently apply the requirement to reflect on observed phenomena with the underpinning of theory and to strengthen the connections between theoretical and practical courses.

Video v kombiniranem izobraževanju učiteljev: orodje za praktično analizo poučevanja
V članku je predstavljena študija primera uporabe videoposnetkov za razvijanje spretnosti študentov razrednega pouka pri analizi pouka. Študija temelji na vsebinski analizi opazovanja poučevanja, pisnih del učencev, povratnih informacij učitelja, učnega načrta, virov, evalvacij študentov in intervjujev z univerzitetnimi učitelji. Rezultati raziskave kažejo, da je uporaba videoposnetkov smiselna in motivacijska za študente in univerzitetne učitelje. Prav tako rezultati kažejo, da se študenti pri analizi situacij le redko opirajo na teoretično znanje. Za povezovanje teorije in prakse je zaželeno, da se dosledno izvaja refleksija o opazovanih pojavih, ki temelji na teoriji, in da se okrepijo povezave med teoretičnimi in praktičnimi predmeti.

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Introduction

In recent years, owing to the shortage of qualified teachers, there has been an increasing demand for undergraduate studies in a blended form, i.e., a form that combines face-to-face teaching and online teaching (Rooney, 2003). It is also necessary to recruit candidates for teacher education from among people who have been working in the field of education for a long time and who therefore, often because of family commitments, cannot pursue a full-time form of study (Brücknerová et al., 2020). Teacher educators are faced with the challenge of designing their courses to achieve maximum effect with a limited number of face-to-face meetings and practice in schools under the supervision of selected teachers (Loudová Stralczynská et al., 2022; Stará et al., 2020). The notion of the teacher as a reflective practitioner (Schön, 1983) requires finding new ways to link theory and practice even in these limiting conditions.

The use of videos in teaching is one of the ways to achieve the connection between theory and practice and the development of reflective skills among students (Vondrová et al., 2020). The literature on the use of video to link theory and practice in teacher education is relatively extensive, but the time constraints of teacher education students' curricula and conditions are not always considered. In our article, we will therefore present a case study of the use of videos in a blended form of study, where the teacher must choose teaching approaches and methods that respect the low time allocation for teaching. Our intention was to describe and evaluate these approaches. We believe that this case study can encourage other teacher educators to think about the potential for using video in teaching and any possible teaching innovations in the limited conditions of teaching and practice.

Video in teacher education

Videos are a valuable tool for learning by and for training future teachers. The criticized gap between theory and practice in teacher education can be bridged to a certain extent through videos (Laurillard, 2002, Cannings and Talley, 2003; Vondrová et al., 2020; Wang, 2013).

The use of videos has been facilitated by technological advances and the digitization of teaching resources (Brunvand, 2010; Calandra and Rich, 2014; Goldman et al., 2007; Sherin and Han, 2004).

The experience of distance learning in the COVID-19 era has led to significant development in the skills of teacher educators in using digitized materials to support and manage student teachers' learning (Ali, 2020; Sari and Nayır, 2020). Analysis of video sequences of teaching has become an important part of teacher education in many departments (Masats et al., 2007).

According to Yung et al. (2010), video recordings of authentic situations have a positive impact on the professional skills of teachers and student teachers and enable learning at the emotional, social, cognitive, and psychomotor levels. After working with videos during autonomous training, teachers demonstrated a better ability to define and exemplify targeted professional competences (Meyer, 2010).

Yung et al. (2010) identified three main processes that accompany video use and support learning. These are critical thinking, meaningful comparison, and productive discussion. These then lead student teachers to theorize, contextualize and design contextual adaptations in their own practice.

Masats and Dooly (2011) point out that when watching video recordings, student teachers view the observed teaching from the position of the teacher as well as the student, which is crucial for the development of their teaching competences.

In teacher training, it is often impossible to provide sufficient direct contact between teachers, students in schools, and student teachers, especially in distance or blended forms of study (Moore and Kearsley, 1996; Northrup, 1997). It is here that working with videos seems very important.

Working with video offers multiple advantages. It allows one to link video viewing with discussion or to watch specific parts of a video repeatedly and focus on details. Student teachers can observe other teachers' teaching, but they can also make recordings of their own lessons and reflect on these–individually or in a group of student teachers. Research has confirmed the greater emotional engagement of students when watching videos of other teachers compared to watching their own videos (Kleinknecht and Schneider, 2013), while other studies have found the opposite (Seidel et al., 2011). According to Kleinknecht and Schneider's (2013) research, watching videos of others allows for deeper engagement in the analysis of problematic events. Observing one's own videos versus observing others' videos requires more prearrangement and scaffolding. Zhang et al. (2011) point out that the use of other people's video recordings is often insufficiently contextualized. It is also common that it is inconsistent with the observers' experience or does not match their knowledge.

When working with videos of others, it is possible that the observers are unable to empathize with the teachers and students in the videos (Vondrová et al., 2020).

Group viewing and discussion of the videos allow personal teaching experiences to be brought to the group and learning to be shared with others (Kang and van Es, 2019). It is also research verified (Tripp and Rich, 2012) that teachers and student teachers prefer group reflective tasks over individual reflective tasks, but also that group reflection is more effective when preceded by individual reflection.

The literature cites the benefits of working with videos that are examples of good practice (Kang and van Es, 2019) as well as the benefits of using cases depicting teaching that is in some way lacking (Krammer et al., 2015). In particular, the advantage of videos that are examples of good practice is that they are more motivating for students. Students' reflection on such videos tends to be more thorough and sophisticated (Janík and Minaříková, 2011). The disadvantage is that these videos do not offer the student situations in which mishaps occur. However, the student should also be systematically prepared for these. Conversely, the advantage of videos that are not examples of good practice is that they can be used to demonstrate specific and clear deficiencies. As a rule, they are obvious and can therefore be easily detected by the student. However, analysing these videos risks providing students with insufficient stimuli to develop adequate professional competences (Gaudin, 2014).

Aim and methodology of the research

Undergraduate teacher training programs in a blended form, suffering from lack of time for supervised practice in schools, can use virtual apprenticeship through video teaching sequences. Since we could not find research on how individual teacher education programs and individual teachers approach such an option, we decided to map this issue as a descriptive case study (Yin, 2009).

The aim of the research was to describe a case of using video in the blended form of studying a key course in the undergraduate preparation of primary school teachers at the Faculty of Education of Charles University in Prague. We posed the research question, How are video recordings of lessons used in a course that aims to teach student teachers to analyse primary school teaching?

In order to meet this objective, the use of videos in teaching the course was examined through observation, analysis of audio recordings of discussion in face-to-

face teaching, analysis of students' written work and teacher feedback on this work, analysis of documents such as the curriculum of the Primary Education Teaching program, course syllabuses, analysis of student evaluation of lessons, analysis of video recordings used, and analysis of interviews of university teachers.

The main research (observation of teaching, interview of university teachers) was carried out in the academic year 2020/2021. Analysis of documents, student assignments, and their evaluation were also carried out for the two previous academic years.

The data collection and analysis were conducted by 3 university teachers, one of whom is a teacher of the course under study. We are aware of the limitations of this approach because the teacher of the course is not an independent researcher. However, given that this researcher has a broad understanding of the case study context and is motivated to truthfully describe and evaluate the reality of teaching the course with the use of video recordings to learn from and participate in innovations in the use of video in further teaching, we believe that the limitation of the approach is outweighed by these advantages.

Observation records and written materials were subjected to content analysis, with the researcher focusing on the characteristics and type of video recordings used, the way of watching the video and working with video recordings, course evaluation by students, and evaluation of the work with video recordings by university teachers.

Regarding the latter point, the researchers independently conducted a subjective evaluation of the use of videos in the course. They freely articulated the individual strengths and weaknesses of the case. The researchers presented and discussed their evaluations in a joint meeting.

An audio recording was made of the presented evaluations and the subsequent discussion, a recording which was then made available to all three researchers. This was then compiled by one of them into written conclusions. These were then commented on and discussed in a shared environment until the researchers agreed on an evaluation with which all three agreed.

Teaching practice course – context and objectives

TP I is taught in the 2nd year of the 5-year master's degree program Teaching at Primary School in parallel with the course Theory of Primary Education I (TPE I).

It aims to link the knowledge acquired in the latter course with observation and reflection on teaching in primary school, to broaden students' understanding of the ways of teaching in a contemporary school. Different teachers are involved in the teaching of the two courses. In both courses, self-study, and completion of tasks by the students are assumed. In the blended form of study, TPE I is endowed with 4 ECTS and 18 hours of face-to-face lessons. The monitored course TP I is also endowed with 4 ECTS, but only 4 hours of face-to-face lessons organized in one block at the beginning of the semester. In addition to the face-to-face sessions, students are expected to complete at least 12 hours of individual practice in a school where the student works or which he/she addresses independently.

The TP I group consists of 35 to 40 students. Several of them are already working in education, usually as primary school teachers, and are now completing the required qualifications by studying. The study group also includes individuals with no previous practical experience.

The course aims to develop the skill of systematic analysis of teaching. Students learn to observe other instructors' teaching, reflect on it, and evaluate its quality in evidence-based criteria. Students' base knowledge is provided by the parallel course TPE I. The course under review is followed by Teaching Practice II (TP II) and Theory of Primary Education II (TPE II). In TP II, students are already independently teaching and analysing videos of their own teaching.

Research results and discussion

The teacher chose to use a video containing a recording of a lesson taught by an experienced primary school teacher. The teacher justifies the choice of the video by stating that some students are overly critical after watching an example of inferior practice and make and verbalize quick and fundamental judgments that need to be worked with (Kleinknecht and Schneider, 2013). The researchers agreed that students, especially those from sites where there are limited numbers of teachers, need to encounter good practice more often, which is why they consider the choice of a video recording with good practice to be an effective step.

Nevertheless, some students argue that they find it difficult to believe the reality of the recordings. This fact confirms that selecting recordings of good practice can be motivating and allow students to have higher expectations of their practice.

Before the viewing, students were asked to think of one lesson they had taught or attended as an observer, which they subjectively considered successful.

In heterogeneous groups, they then briefly described each lesson to the others, highlighting the phenomena they considered to signal teaching quality. The group task was to find common characteristics of 'good teaching'. The teacher facilitated the discussion to reach collective agreement among all groups on the typical characteristics of good teaching. The result of the joint discussion was then compared with the list of observable teacher skills formulated in the document *Framework of Teacher Professional Qualities (PQF)* (Tomková et al., 2012), which is one of the tools used for self-assessment and evaluation of teaching in the Czech Republic in conditions where there is no standard for the teaching profession (Loudová Stralczynská et al., 2022).

The aim of this part of the lesson was to make students realize that they can intuitively identify many of the teaching qualities, but at the same time, that opinions on what can be considered quality vary. In the researchers' peer discussion, it was pointed out that in this activity, students were not challenged to argue with the support of theoretical concepts conveyed to them in theory-based courses, including the concurrently taught course TPE I.

While watching the video together, the students were supposed to focus attention on the teacher's assigned professional skills area from PQF. Supported by a worksheet listing 4 to 5 criteria from that document, the student is to record whether evidence of meeting the criteria can be found in the lesson.

After watching the video, the students shared their notes in groups, and in a teacher-facilitated discussion, they argued, supporting their assessment of the observed teacher's skills. In case of disagreements, a selected portion of the recording was watched repeatedly. They were also aware of the interrelationships between each criterion in a complex teaching situation. Students were encouraged to reflect on the observed and described teaching, and to consider alternative solutions. PQF served as support. The researchers agreed that students were not encouraged to make more substantive and reasoned responses in line with the theory of teaching. The theory was not usually explicitly mentioned, nor was it directly referred to. To make students aware of the importance of theory, the theory could be explicitly mentioned by the teacher, and students could be directly asked about it. For example, in the demonstration below, students could have been asked about what they were being taught simultaneously in TPE I, e.g., what features of dialogic teaching could have

been and were not seen in the recording. In this way, students could revise the theory (Šeďová, 2021).

> T: Do you think that criterion 2.5 has been met?
>
> S1 I think definitely. The teacher repeatedly asked the students for their opinion and praised them.
>
> T: Is there an agreement then? Or does anyone have a different opinion?
>
> S2 Well, I don't know, she asked, but then maybe she didn't react to what they said. The boy who asked if the animal was a mammal or not didn't get an answer to his question.
>
> S1 Oh, I didn't even notice that.
>
> S3 Maybe it has more to do with criterion 2.4., but it seems to me that it was the extroverted kids who raise their hands and are fast enough that had the chance to say something.
>
> S4 She didn't have to call them out right away, but maybe should have required everyone to write down the answer first. Or use a lucky dip; it's worked well for me.
>
> T: Does anyone have any other recorded moment that would be evidence of meeting or not meeting criterion 2.5?
>
> S5: Although it was not seen in this lesson how they work with it, they have a rule on the notice board 'We listen to each other', so I suppose it is important for the teacher to guide them to do that.
>
> S6: Or maybe it's just formally on there. Other times she might do it, but it wasn't visible in this lesson.

Students then independently briefly summarised the strengths and weaknesses of the lesson, formulated questions they would like to ask the observed teacher and reflected on the benefits the observation had for their own teaching.

> S1: The strength of the lesson was the use of a wide range of methods with an emphasis on active learning and cooperation. Students worked in pairs and in cooperative groups, where they had assigned roles to promote positive interdependence between members. The teacher often asks open-ended questions in discussion to promote the development of higher-level thinking skills and encourage students. The classroom environment was tailored for cooperative learning. Collaboration between the teacher and assistant was effective. Question for the teacher: How should group members be changed and how frequently?

In the final discussion, students were asked to generalize the experience.

Direct teaching was followed by a series of tasks in the LMS Moodle environment. In 2020/2021, students individually analysed in writing a video recording of the lesson different from the one used in the direct session. They observed different or additional quality criteria from the PQF observable in the lesson. They rated each other's work anonymously. The video recording matched the same criteria as the video recording observed together and was selected by the teacher.

In 2018/2019, students freely discussed a specific video recording in an online discussion forum. Each student was required to contribute to the discussion at least once. On average, each student contributed twice to the discussion. The lecturer entered the discussion twice, mainly to appreciate the activity and encourage a plurality of opinions, to monitor compliance with the rules of the discussion, and, if necessary, to point out deviations from them, to give suggestions for new aspects of the discussion.

Spontaneously, student attention has been shown to be directed toward the teacher's activity rather than the students', which is especially common in the early years of study (Santagata et al., 2007). Students focused on the quality of the teaching process rather than on the effectiveness of the process for students' learning relative to the objectives, even though the objectives are the core curriculum in TPE I (Stará and Starý, 2019). Students who were concurrently teaching often compared the teaching from the video with their own, thus reassuring themselves about the quality of their own practice. At the same time, they tended to point out critical points in the analysed teaching but were not always consistent with their supporting arguments. Arguments explicitly pointing to connections with theory were sporadic and tended not to refer to specific research or researchers; instead, students made comments such as; "That's what we talked about in the lecture." The contributions of students with little or no actual teaching experience were fewer and less comprehensive. These mainly appreciated specific ideas from the teacher and possibly fellow students, and only rarely suggested alterations. Some students contributed rather formally to the discussion, or it was clear that they had not watched the video in its entirety. Some commented, in the teacher's opinion, on irrelevant details about the lesson or details without much potential for generalization. The discussion was long; some students did not read it all, and therefore some comments were repeated. This is also why, subsequently, in 2019/2020 and 2020/2021, students had the option to choose from three different shorter video recordings, one of which, given the situation of the COVID-19 pandemic, was a demonstration of online teaching.

This video recording was clearly responsive to the current needs of students, as it received by far the most comment.

In all three years, students were asked to select three different situations from another video lesson. They were to label the selected sections with a time stamp and comment on them. After all the assignments had been handed in, the teacher summarised in writing the phenomena that the students had selected and how they had commented on them. She also summarised what had attracted little attention.

The teacher provided the teachers on the recordings with the comments of students. They reported that this served to motivate them for future cooperation.

Evaluation of the use of video recordings by the teacher and students

The course has always received high ratings (95%, 81%, 94%, 86%) in the anonymous student university evaluation survey. Below are typical student comments on this evaluation:

> S1: The course confronts us with real practice. I find it greatly beneficial because as an observer I can replay interesting moments or pause and reflect on them. It is true that the viewer misses out on the specific atmosphere in the classroom, but it has these certain advantages as well; S2: The opportunity to watch videos is inspiring for me, their analysis makes me think not only about the work of my colleague in the video but also about my own work; S3:Practical demonstrations, sharing ideas – anything that helps to bring practice closer. I appreciate and find the forums helpful in sharing ideas and experiences. I have started to use some of the ideas shared in my own practice. I also find it beneficial to work with video recordings of lessons, especially for time reasons. It is very problematic to combine the time of classroom observations with one's own schedule.
>
> Collaborative video analysis brings experience and emotion into the classroom (Kleinknecht and Schneider, 2013): S1: I was pleased that the teacher handled it in a similar way to me, assured me that it is a good way; S2: It was only when watching the video that I realized why giving precise instructions to the students is so important; S3: Ugh, I hope I don't really come off like that.

The main benefits of the use of video, as the teacher and two colleagues affirm, are that it allows bringing the image of practice into the lessons. The students are highly active in such teaching, even in a relatively large group.

They consider that by watching, analysing, and discussing the video situations, they are learning important skills that are relevant to practice.

The researchers stated that the practice of stopping the video and replaying some parts of it according to the needs of the group was effective. In addition to other benefits, it encouraged students to seek evidence for their claims and evaluations. Less often there was a naming of what was seen with the backing of theory.

Collaborative practice in analysing observations using video is likely to translate into a relatively high-quality level of performance in subsequent tasks in the online environment and can be expected to enhance the effectiveness of observations in individual practice where the tutor cannot be present with the students.

The linking of video work in a face-to-face meeting and subsequent independent work with another video in an online environment was identified as a supporting factor. In addition, a combination of individual and group reflective tasks also proved appropriate to eliminate the drawbacks of each approach and reinforce the benefits.

Watching videos can also encourage students to use video training, or filming and analysing their own teaching, as one of the effective methods of supporting the development of professional practice skills (Hamel et al., 2019; Janík et al., 2016).

The researchers believe that students with longer experience gain less from the course and that, conversely, students with little or no practical experience of self-directed teaching and students with low reflective skills in general particularly benefit from the course. However, this hypothesis has not been verified. In future, there is a need to identify greater challenges for students with more experience and more highly developed professional skills and to provide them the support enabling them to work effectively on their professional development.

According to the researchers, the phenomena that the students notice and how they interpret, comment, and evaluate them are also enriching for teachers and increase their understanding of the specifics of the context in which the students work in practice.

The researchers also agreed that providing the primary school teachers with feedback makes them feel the importance of their work and deepens the collaboration between primary school teachers and university teachers and their mutual learning.

Video usage limits

Over the years that videos have been used in education, the GDPR rules have gradually become stricter. Unfortunately, these rules have led to a reduced database of suitable recordings and increased cost and time to acquire new recordings.

Another limitation may be the exclusive use of video recordings illustrating good practice (see above). One of the practical implications of this study was the decision of lecturers to focus on the facilitation of common practice video recordings in other courses in the curriculum. Also, the fact that the course does not offer students the opportunity to work with video recordings of their own practice, even though we know from the literature (see above) about the benefits of working with this type of recording, led the researchers involved to conclude that the follow-up course would predominantly use recordings of student teachers' own teaching experiments.

Conclusions

The ability to analyse learning situations is a prerequisite for effective action in these situations (Sherin and Han, 2004; Sherin, 2007; Berliner, 2001; Kersting et al., 2012). The use of videos enables the development of the ability to analyse situations and thus contributes to the development of desirable professional skills. In this respect, the use of videos in the case under study has proved to be meaningful to both student and university teachers.

The use of videos allowed students to practice argumentation and learning through sharing of individual opinions and arguments in a limited time. It was evident that the advantage was that the videos made it possible to observe the given teaching repeatedly.

However, it has been shown that students rarely rely on theoretical knowledge, even though they have a course dealing with the theory of teaching in the curriculum in parallel with the observed course. In this respect, we consider it desirable to deepen the cooperation between teachers of theoretical and practical courses and to consistently apply the requirement to reflect on observed phenomena with the support of theoretical knowledge.

The opportunity for group reflection on video situations is highly appreciated because it allows students to view the same elements from various angles, making them aware of details they may not have otherwise noticed and significantly improving their learning.

In this instance, there was also learning by the instructors, who provided a recording of their lessons and then received written comments from the students. This is a good illustration of effective collaboration between university and primary school teachers.

It appears to be effective and to ensure the systematic development of student teachers' analytical skills when video work is combined with individual and group reflective tasks in both face-to-face and online settings. The practical emphasis of the instruction, the applicability of the learned material to the practice, and the motivational quality of the observed instances are all valued by the students. The lessons are made more emotional and experiential by the videos and their analysis.

The results of the study contributed to the planning of partial innovations in several courses of the study program and the introduction of a collaborative system of setting requirements for the fulfilment of these courses to link the theoretical and practical knowledge acquired in these courses.

Given the time constraints on teacher education, we hope that these findings will inspire teacher educators in using video in their teaching, especially when they suffer from a lack of the time that would allow them to guide student teachers in regular practice in schools.

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