

The use of digital teaching aids in primary education with emphasis on students from socially disadvantaged backgrounds

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Abstract: *Authors point to “potential educational inequalities generated by technological change” as factors limiting the rise of the information society (Arntz et al. 2016, p.25). Not only lack of access to digital technologies but also lack of positive attitudes towards the use of digital teaching aids can be identified as a risk factor of digital literacy development, particularly among students from socially disadvantaged backgrounds. (Livingston-Helsper 2007; Zevenbergen 2007; Czerniewicz - Brown 2013). The empirical findings of a slightly negative attitude towards the acquisition of digital skills as well as lack of access to Internet that remained at level 25% in 2018 to compare 26% in 2015 according to Velšic (M. Velšič, 2018) declare the persistence of digital divide in sociodemographic comparison in Slovakia. Based on the analysis of foreign and domestic studies (PIAAC, PISA ICILS) and empirical surveys in Slovakia, we monitor the persistence of the sociodemographic digital divide in Slovakia. Whereas the digital socialization takes place not only in nonformal and informal way but also within formal education system, we present findings of the use of digital teaching aids in formal education. Based on empirical findings on the sample of Slovak primary schools' teachers in towns Spišská Nová Ves, Nitra a Lučenec we followed a) the perception of digital pupil access by teachers, the ways of compensation for the lack of digital access of students in the school environment, b) examines the teachers' views on benefits and limits of using digital educational aids in schools with students from socially disadvantaged backgrounds a c) identifies ways of compensation for a insufficient digital access of students. According to teachers' statements, not only the lack or insufficient digital access but also the insufficient digital pedagogical ethos of students and parents (that covers the attitudes towards the use of digital teaching aids) can be classified as a barrier to the use of digital teaching aids. Introduction of free computer lessons in after school club in schools, the use of digital teaching aids in preparing for school at a school club, are perceived by teachers as a way of compensation for the lack of digital access for students from a socially disadvantaged environment.*

Key words: *Digital access, digital ethos, digital teaching aids, students from socially disadvantaged environment, digital divide.*

Introduction

The field of digital technology application in the socialization process has become a major subject of interest in the cultural theory of the information society (F. Webster, 2002) that follow the trends in sociodemographic digital divide, digital equity and in intergenerational reproduction of digital participation patterns. In the theory, the rise of a digital generation of students can be identified as one the indicators of information society development. Thus, digital socialization is examined in its sociodemographic and intergenerational context. Digital socialization take place both in formal and informal dimension. Students grow up surrounded by digital technology since birth and at the age of four years gaining first experience with activities in the digital space (Tuukannen, Wilska, 2014). Different domestic and foreign studies focused on the different experiences and skills of students entering pre-primary and primary formal education system. According to several studies, there are significant differences in the level of digital skills, in the digital access and the use of digital skills in practice at the time of entry into primary education among students of families with different socio-economic status (Sackes, Trundle, Bell, 2012, M. Neumann, Fish et all, 2008, Livingston, Helsper, 2004, Czerniewicz, Brown, 2013). Differences in digital participation of students are already visible in pre-primary age students from a socially disadvantaged environment are identified as “digital aliens” who, unlike the so-called " digital elite” have limited access to digital technologies (especially the Internet) and their contact with digital technologies is more formal (Czerniewicz, Brown, 2013). In Slovakia, socialization into digital space has been a part of the formal socialization process since 2004 when digital classrooms were set up in Slovak schools. Besides informal digital socialization in the domestic environment, formal digital socialization within education system shape the rise and formation of digital generation of young people in Slovakia.

In the context of the EU's strategic objectives, the development of digital literacy is being analyzed not only in terms of increasing employability chances in the labor market but also in terms of promoting integration and citizenship. Fostering successful social integration of students from a socially disadvantaged environment by encouraging their successful socialization is a challenge also in Slovak conditions as the share of people with lower education than ISCED 3 can be identified as the persistent problem of the part of the population that is at the same time at greatest risk of poverty (Smarter, green, more inclusive - indicators to support the Europe 2020 Strategy, 2017). Young people with low levels of education are less often active citizens and less involved in adult education.

As shown by several qualitative studies in Slovakia, students from the socially disadvantaged environment, especially Roma students and students from socially excluded environments, represent a group that is currently still at risk of lacking digital access in the context of the use of digital technologies in the educational process (R. Medved'ová, 2016). The use of Internet as a learning aid at the lessons and for homework, however, is becoming a widespread activity of students in the digital space. The use of Internet use for learning can be identified as one of the activities that students perform most often in the digital space (M. Porubčinová, 2016). Similarly, the empirical data point to an increase in the assessment of the importance of using digital technologies in the teaching process in different age groups (M. Velšic, 2015). The analysis of the use of digital technologies has become a research challenge in view of the potential that digital technologies offer in the education process of different groups. Foreign and domestic studies provide findings on the specific benefits of digital teaching aids even in the context of educating students from a socially disadvantaged environment. In view of the persistence of digital divide in both intergenerational and socio-demographic comparisons, the attention must be paid to the conditions of digital access and the applicability of digital teaching aids in teaching students in socially disadvantaged environments. The task is urgent even in a view of the fact that the experts identify the persistent "inadequate, low level of education as a hindrance to Roma problem issues" (Klein, Rusnáková, Šilonová, 2012, p. 11). This paper follows findings in the area of digital access and use of digital teaching aids regarding students from socially disadvantaged backgrounds. Based on empirical findings on the sample of Slovak primary schools' teachers we examine a) teachers' perception of digital access of students, b) ways of compensation for the lack of digital access of students at schools and c) the teachers' views on benefits and limits of using digital teaching aids. Digital socialization of students from a socially disadvantaged environment is identified by on the level of intergenerational and sociodemographic reproduction of digital literacy, attitudes towards digital technologies and access to digital technologies based on empirical data of PIAAC, ICILS studies and representative empirical surveys in Slovakia.

Benefits of using digital learning aids for students from a socially disadvantaged background.

Considerable attention has been paid to the use of digital technologies in formal education system as for example the use of e-books and their contribution to the development of literacy skills and graphomotor skills (de Jong, Bus, 2002, s.145- 155, O. Korat, 2006, s.24-31, Segers, Verhoeven, 2005, pp. 17-27), analysis of portable touch media devices (tablets) (M. Neumann, 2011, p.109-122, K Goodwin, 2012, P. Saine, 2012, p.74-79), or different types of iOS (i-operating systems) such as iPad, I Pods and Smartphones (Murray,

Olcese, 2011, p.42-49). Digital technologies in the context of pedagogical activity refer to "a wide range of resources, tools, environments and computer practices that we use to support learning and learning, communication and collaboration, expression, creation, etc., that is to support all students's, students' and learners' of all ages development domains "(Kalaš et al., 2013, p. 14). The term digital teaching aids will be understood as teaching aids created by digital technologies (digital technical devices) such as e-books, educational applications designed for training and verifying the subject (digital educational games such as reader applications, mathematical applications, creative applications), digital presentations designed to present the curriculum. The function of digital technologies in teaching can be assigned not only in a field of technical devices but also in field of managing the teaching process and the regulation of learning itself (Kožuchová et al., 1998). The functions of digital teaching aids include "practice, presentation of the subject, stimulation, and use in didactic games" (J. Skalková, 2008, p. 254).

Empirical observations on the use of e-books in groups of students from families with different SES have confirmed by Korat and Shamir (2008) as the improvements in students' reading literacy achieved among students from families with different socio-economic status (SES). Although students from lower SES families were disadvantaged in important reading skills¹, the use of e-books within the framework has contributed to the noticeable improvement in this group. According to authors, "students from a disadvantaged environment were able to make considerable progress in reading skills after engaging in a brief but motivating activity by the educational e-book" (Korat, Shamir, 2008, p. 121). Findings on the benefits of using e-books in pre-primary and primary education similarly confirmed positive impacts of e-book use on the development of literacy in word development, text comprehension and word recognition (Segers, Verhoeven, 2005, O. Korat, 2006). Other studies have highlighted the elements that need to be considered when designing e-books for educational purposes, such as the use of icons the child can click and games available as part of eBooks that can act as distractors distracting the attention of students when reading e-book (Plowman, McCake, 2013, de Jong, Bus, 2002). According to the authors, the advantage of reading e-book for a small child by adult is identified in higher possibility of adapting

¹ Based on the results of early childhood emergent literacy (word recognition, word recognition, digitization, word recognition), students from higher SES families have significantly higher scores in this area than students with lower SES families. According to Korat, Klein and Segai-Drori (2006), students from low SES families reached lower level of home literacy environment (HLE), identified by parenting readings for young students, the number of students's books in the home, parental knowledge of books.

and creative responding of adult to impulses of child while reading which is not available when using e-book by child alone separately (Plowman, McCake, 2013, p. 29).

Though studies have confirmed the potential of appropriate e-books and other technologies such as touch mobile devices in using as additional devices to regular reading at home and at school environment, it should be stressed that "the potential of tablets to support the development of early reading literacy in young students is related to the quality of digital interaction" (M. Neumann, 2014, p.110). According to empirical findings among Australian pre-schoolers, the use of touch screen tablets was associated with emergent literacy skills (letter name and sound, numeral identification, print concepts and name writing), the correlation between the advances in the field and the time spent in the use of tablets in students has not been confirmed (M. Neumann, 2014, p.116). According to the author, the type and quality of applications and the attitudes of parents to use of tablets is significant as the use of desktop computers but not computer games may be related to the development of reading skills. The impacts of digital technology use in the learning process have also been explored in developing social competences in the field of cooperation when working with digital technologies in a classroom. Finally, specific contribution of digital technologies in the learning process can be recognized among students with learning difficulties, based on the findings of the impact of audio-visual training on improving phonological skills and recognizing written words in dyslexic students, similarly in the case of the use of mobile touch devices among students with disabilities who have limited capabilities to use classical tools in training the necessary graphics skills (Magnan, Ecalle, 2006).

Studies have confirmed the potential of suitable e-books and other technologies, such as touch-based mobile devices as additional devices alongside regular class reading at home and in the school environment (Plowman, McCake, 2013). Besides e-book, digital education tools in the category of educational applications can include *literacy applications* combining letter, audio, written, pronunciation, *creative applications* that provide tools for painting, drawing, building, designing, puzzle, creating music, *mathematical applications* that include numerical identification, counting, time and spatial orientation, and other educational applications that include general educational activities to improve memory, language skills, and general knowledge (M. Neumann, 2014, p. 116).

The content of educational applications can be defined in the categories of "teaching educational technologies" (R. Means, 1994, p. 9), with the prevailing share of direct learning, lectures or work with textbooks. This way of learning using digital educational applications lies predominantly in providing information, presentations and simulations and is intended for

practical exercises when students answer questions. In addition to the teaching educational technologies, the author also distinguishes "exploratory learning technologies" when the user makes information decisions and technologies that are primarily not intended for use in schools but can be used for educational activities such as digital games. According to Murray and Olcese's content analysis of digital educational applications, most of the digital educational applications were found to be focused on an individual user base rather than on collaboration.

The applications analyzed by the authors were primarily focused on receiving content (text, audio, image information), but only to a lesser extent focused on creative content. There are also the examples of creative-oriented learning applications that include space-simulation, music applications, or maps-based mapping applications using the GPS system (Murray, Olcese, 2011, p. 47). However, as stated by the authors, "there are few examples of iPad applications that are truly innovative" (Murray, Olcese, 2011, p. 46), when many applications replicate existing content. The examples of interactive use of digital learning tools in Slovakia are presented f. e. in the field mathematics (H. Barániková, 2012), in teaching STEM experiments (Válková- Ožvoldová, 2006) or by the application of social networks in education (E. Poláková, 2012). Digital technologies allow to create a common set of knowledge for teachers (digital libraries, educational portals) (Bobot -Jakubeková- Rurák, 2012). The benefits of using i-OS educational digital applications are related to mostly to the operational and software capabilities, the possibility of replacing expensive textbooks and study materials, the ability to work in a multilingual environment or, in the case of music applications, the ability to work with a wide range of musical instruments. The specific benefit of using digital technologies is a possibility to share created works and store their cloud computing services.

However, regarding the future challenges in this area, the attention should be paid to the cooperation of IT professionals and education professionals in the development of digital educational applications of creative character (considering also educational needs of students from socially disadvantaged environment). There are several examples of innovative ways of the use of digital learning environments also in the context of Education 4.0 development (Richert, Shehadeh, Willicks and Jeshke, 2017, Quint, Sebastian, Gorecky, 2015).

Sociodemographic determination of digital literacy, digital ethos and digital access

The metaphor of "digital immigrants" and "digital natives" by Mark Prensky (M. Prensky, 2001) has expressed the original intergenerational distribution of digital literacy among the first members of the Internet generation and their

parents at the turn of the millennium. This distribution has later been later widened by the concept of digital aliens and digital elite (Czerniewicz, Brown, 2013) based on the analysis of the differentiated use of digital technologies in schools as well as on the example of the different forms of digital habitus that students bring with them as soon as they enter school education².

The persistence of the reproduction of different patterns of digital habitus in the intergenerational comparison was confirmed by empirical findings from abroad, according to which socio-demographic factors in the form of socio-economic status of the family are significantly involved in the differentiation of digital literacy, ethos and access as students, who do not use the internet or are among poor internet users, were mostly students whose parents work manually (Livingston, Helsper, 2007). The importance of socio-demographic characteristics in digital access has been confirmed by the findings of Czerniewicz and Brown, (2013), according to which it is only a "digital elite" of young people who grow up with computers and get acquainted with them informally.

In the field of digital access in schools, it is possible to monitor the differentiated formation of digital habit of students with different sociodemographic status through indicators such as computer facilities in schools, classroom placement, number of students per computer, frequency of access and use of digital technologies by students at school. Similarly, it is possible to compare the focus of students's activities in the digital space (the area of digital ethos) (Judge, Puckett, Bell, 2006). According to the findings of the benefits, the limits and the extent of use of digital teaching aids, the socio-economic status of the family has a significant impact on the development of

² The concept of *digital habitus*, which reflects the social-demographic differences in digital competence and attitude within the older generation to a digital world, represents the theoretical basis of the analysis of digital participation of students in the context of inter-generational reproduction cultural models. The term is applied analogously to the kind of *technological habitus* in the context of the analysis of man's relationship to the technological environment. The analysis of the digital habitus involves the analysis of the actual level of digital competence (digital literacy), analogous to the area of symbolic cultural capital, b) the analysis of the digital ethos – analogous to the pedagogical ethos covering the attitudes, opinions and patterns of activity in digital space (that can be identified in areas such as the extent and forms of the digital participation in practice, parental mediation of the scope and forms of the digital participation of students or the perception of the positive and the risk aspects of the digital participation) and c) the area of digital entrance – analogous to the field of material (externalized) cultural capital following the entrance to the digital tools. The area of the patterns of activity and the attitudes of students and parents in the digital space which is referred to as the digital (attitudes to the digital participation) (Zevenbergen, 2007, Bourdieu-Passeron, 1990).

students's digital habitus already in pre-school age (Sackes, Trundle and Bell, 2011, Korat, Samir, 2008, Livingston, Helsper, 2007).

Similarly, compensating for some of the symptoms of disadvantage in forming a digital habitus of students who do not have access to digital technologies at home is relevant already in pre-school age (Zevenbergen 2007). The school environment has the potential to involve the use of digital technologies in education in a variety of forms (such as digital textbooks or exercise books) to compensate for inadequate access to digital technologies in the home environment. Regarding the development of multidimensional literacy (multiliteracy practices), in which literacy and digital technologies converge, the authors stress that “an adequate level of computers equipment in classrooms can help overcome the entry gap in the digital skills of students before entering school due to different SES of families (Sackes, Trundle and Bell, 2011, p. 1698).

Whereas cultural capital, pedagogical ethos and material cultural capital of students is discerned empirically in relation to SES of parents (Bourdieu, Passeron, 1990), it can be assumed that the digital literacy, digital ethos and digital access of students also are being formed in relation to the sociodemographic factors. In Slovakia, **the impacts of the digital habitus as a mechanism of inter-generational reproduction of digital literacy was confirmed by the findings of an international study ICILS 2013, according to which students with a better quality of home backgrounds (with a higher level of education of parents, a higher status of working parents and a greater number of books in the home) achieve better results in computer and information literacy.** Different forms of digital approach are evident when entering school in relation to sociodemographic factors. The influence of parental education on students' level of digital competence is also supported by the findings of the PIAAC study (2013) that focused on qualitative competencies assessment including digital competences and the ability to use them in practice. In the case of competence to use digital technologies to solve problems (solving problems in a technically advanced environment), only 0.6% of person tested in Slovakia, whose parents did not complete secondary education, achieved the 3rd (highest) rating and only 7% the second level of assessment of this ability. Studies of digital equality in the education system environment highlight the proven differences in the practical use of digital technologies in the education system in schools with different socio-economic status (SES).

Challenges in the level of digital access as well as the digital ethos of students continue to persist evidenced by findings in differences of digital technology use in school by SES. According to the empirical findings, the digital activities in schools with a high share of students from the low-income families are more focused on practice than in schools with the prevalence of

students with higher SES families using sophisticated and more complex applications (Fish et al, 2008, s. 101). According to Kusá et al. (2010), differences between schools in the emphasis on learning outcomes relate to the right of parents to choose a school in Slovakia, leading to a different concentration of students with different family backgrounds in particular schools.

Empirical findings of the use of digital technologies in the formal primary education system in Slovakia

In an international comparison, Slovakia belongs to the countries with one of the lowest capacities to compensate for disadvantages in education due to SES (PIAAC, 2013). However, even in Slovakia, authors emphasize the potential of the education system to compensate for inadequate home access to digital technologies in the pre-primary formal education. According to Burianová (2015), the use of digital technologies already in pre-primary education is supported by empirical findings on the sample of thirteen kindergartens in Trnava (Slovakia). These findings confirmed the interest of teachers to involve digital technology into the learning program as well as support of these plans by their parents. Within thirteen kindergartens in eleven nurseries regular and active use of digital technologies has been found, in two kindergartens digital technologies are used occasionally. The most commonly used technologies included a CD and MP3 player. Daily, computers, interactive tabs, educational software applications, cameras were used, much less microphones, phones and audio recording devices. Digital technologies were freely available to students in the playroom, in two cases nursery schools had special classrooms for digital technology. Except for one of the nursery schools, according to pedagogues, parents have a positive attitude towards the use of digital technologies in nursery schools, or they let the teachers to decide. According to a qualitative probe by Medved'ová (2016), conducted at a school located near the socially excluded Roma vicinity by interviews with pedagogues of the school, teachers have greatly appreciated the benefits of using digital technologies in teaching students in a socially disadvantaged environment. According to teachers, students read little in general, they do not listen to interpretation, so the use of digital technologies creates an experience, visual environment, which, in view of the missing experiences students need. Regarding digital skills and digital access, kids are skilled, almost all have very good smartphones, tablets, students usually use phones, rarely computers in the home environment. Symptoms of the digital divide are noticeable in digital access in the Roma locality. Due to problematic Internet connection, it is difficult for students to do homework using internet. The best opportunity for students to access the Internet is a computer room in the school, open until 16:00, which students can visit daily.

According to experts, the specific benefits of digital educational applications can be recognized in using digital teaching aids as a complementary tool for practicing the curriculum. With a focus on students from a socially disadvantaged environment and on students with learning difficulties, digital technologies can successfully support effort, motivation and self-confidence (K. Cicko, 2010, pp. 151-155, R. Medved'ová, 2016, pp. 127-138). The use of digital teaching aids during lessons and also in a school club, acts as a positive motivation and an attractive reward for students, as well as an appropriate way to promote the interest, endurance and the effort of students to fulfill school tasks, to practice and consolidate curriculum. The school environment has the potential to involve the use of digital technologies in education in a variety of forms, such as digital textbooks, syllabuses, exercise books, and a way to compensate for inadequate access to digital technologies in the home environment.

The cooperation of teachers and IT specialists becomes an opportunity for the development of pedagogical aids (also) regarding the specific problematic areas of education in the monitored group of students. The cooperation of educators and IT specialists becomes an opportunity for the development of pedagogical aids (also) with regard to the specific problematic areas of education in the monitored group of students. In the case of first-year students who come from a socially disadvantaged environment, problematic areas of education include dynamic practice and phonemic awareness (32.2%), graphomotor (40.68%) and right-left orientation (45.76%), as well as communication, visual and auditory perceptions and mathematical abilities. The basic pedagogical objectives within the group's acceleration program include the development of the ability to communicate in the mother tongue, the development of self-presentation and self-confidence of students, the development of memory, basic thoughts (listening, speaking, own testimonies) (Klein, Rusnáková, Šilonová, 2012, p. 42).

Several quantitative examinations have been realized that bring findings even on digital access of students from socially disadvantaged environment (Kusá at al., 2010). Regarding the sociodemographic digital gap that can be identified in Slovakia (Veštic, 2015), we realized empirical survey on a sample of primary school teachers to identify the digital access of students and to identify mechanisms of compensation for the possible insufficient digital access of students at school. We also were interested in experiences that teachers have with digital teaching aids at schools with students from socially disadvantaged environment³. We have set the research questions: a) What is

³ A socially disadvantaged environment that disadvantages a child in the education process is considered to be an environment characterized by at least three of the following criteria: 1. the family in which the child lives does not fulfill basic functions - socializing, emotional and economic, 2. poverty and material need family of the child,

the digital access of students from socially disadvantaged environment according to teachers' assessment, b) What options for compensating for the insufficient digital access can be identified at selected primary schools?

The empirical research was realized by online questionnaire survey on a sample of primary school teachers in Spišská Nová Ves, Nitra and Lučenec. We also realized telephone interviews with directors of selected schools.

Using online questionnaire surveys on a sample of 97 primary school teachers in Spišská Nová Ves, Lučenec and Nitra, we examined teachers' statements that characterize their experience with the use of digital teaching aids. The findings follow the experience of using digital teaching aids in schools with students from different social backgrounds⁴. According to teachers' answers to the question "*Please indicate whether there are, and if so, any difficulties in using digital teaching aids*", inadequate digital access can be considered as one of the most common barriers in using digital teaching aids. Restrictions on the use of digital devices related to digital access cited by teachers include, in particular, internet access at schools ("inadequate speed", "the internet is slow, weak", "few computers in classes", "old office"). Teachers point to the lack of digital access for students to the Internet as a barrier to the use of digital devices ("some students do not have Internet", "homework .. (using digital aids).. I give only those who have internet).

Teacher's recommendations for improving the use of digital teaching aids in schools can be divided into three areas:

3. at least one of the parents of the child is long-term unemployed, 4. insufficient education, at least one of the parents has not completed basic education, 5. the inadequate housing and hygienic conditions in which the child grows up - absence of a place for learning, beds, drinking water, WC, 6. language of the school is different from the language the child speaks in the home environment, 7. the child's family lives in a segregated community, 8. the social exclusion of the community or the family of a child from the majority society. Of the total number of 440,582 primary school students, 26,306 students are among the socially disadvantaged students.

⁴In Spišská Nová Ves, 605 students (12.4%) of 4862 students in 11 elementary schools belong to the group of socially disadvantaged students. In Nitra, 6686 students study at 19 elementary schools, of which 236 (3.52%) belong to the socially disadvantaged group. In Lučenec, 2812 students are studying at 9 schools, of which 72 are among socially disadvantaged students. We have included 1/3 primary schools in the sample. The questionnaire sent in electronic form was completed by 97 teachers of selected primary schools Ing. O. Kožucha 11 SNV, ZŠ Levočská 11 SNV, ZŠ Markušovská cesta 8 SNV, ZŠ Nad Medzou 1 SNV, ZŠ Benkova 34 Nitra, ZŠ Cabajská 2 Nitra, ZŠ Drážovská 6 Nitra, ZŠ Krčméryho 2 Nitra, ZŠ Škultétyho 1 Nitra, ZŠ Haličská cesta , Lučenec, ZŠ Nám. Kubinyi, Lučenec, Rúbanisko ZŠ, Lučenec, Vajanského Elementary School, Lučenec, Elementary School with MŠ Ulica bratrícka, Lučenec. We also included a primary school in Spišské Hrhové.

(a) improving the quality of school equipment ("efficient internet", "free service", "affordability for all schools", "tablets for each pupil", "providing free educational programs")

(b) teachers training (" teachers training in the use of digital technology")

(c) improving the methodical training ("more online exercises available, more interactive chatting materials", "more accessible teaching lessons", "creating a digital version of a textbook with links to other Internet resources, for teachers)

Teachers' responses realistically included the statements that it is *"appropriate to use digital teaching aids with a measure"*, *"not to use digital devices at school to use the students separately"*, *"to rotate activities"*, and stressed the experience that *"digital lesson teaching can slide to distractors like music, YouTube, social networks "*.

Based on their experience, pedagogues have also highlighted the benefits of using digital teaching aids. These concerned in particular:

a) areas of time effectiveness of the preparation and work of teacher and pupil at the lesson ("time saving", "quick preparation", "quick feedback", "students proceed at their own pace", "quick processing of results")

b) in the area of availability of information sources ("easy access to information", "easy preparation of materials")

c) the lessons of learning (higher "attractiveness", "clarity", "exaggeration", "motivation of students", "increasing interest in learning")

d) development of cognitive abilities ("development of imagination", "development of creativity")

(e) support for the practice and consolidation of curriculum ("the possibility of drilling", "the consolidation of the curriculum")

Similarly, teachers have mentioned the benefit of compensating certain teaching aids by using digital learning aids, such as "the opportunity to present the attempts to which the school does not have the conditions", "a quick replacement of the tools that the school does not have".

Teachers have also introduced their experiences with the practical use of digital teaching aids. In practice, most widespread way of using digital teaching aids include watching videos, movies and YouTube channel in class, reported by 65 teachers of up to 20% of lesson in a class per month, by 14 teachers in the range of 20-40% of the lesson per month, and by 10 teachers in the higher range.

Similarly, the use of digital presentations in classroom was reported by 34 teachers ranging from 20-40% of the lesson per month and by 27 teachers up to 20% of the lesson per month. These devices are not used by only 3 teachers, while 5 teachers do not use movies and videos in classroom. The search for information by students on the Internet is used by 38 teachers in the range of up to 20% and 26 teachers ranging from 20-40% of the lesson in a class per month, while 10 teachers do not use digital teaching at all. Although

20 teachers said they did not use online tests to practice curriculum, 43 teachers use online tests within a range of 20% of the lesson per month, 14 teachers in the range of 20-40% of lesson in class and 17 in the higher grade. The least used digital teaching aids in the classroom include the use of electronic books that are not used by 67 teachers, the use of online tests in the evaluation of the lesson (unused by 44 teachers), and the play of online learning games not used by 27 teachers. However, the use of digital educational games is a learning tool for 43 teachers, up to 20% of classes per month, while ten more teachers use this tool even more often.

We were wondering if educators are using and, if so, to what extent, different forms of digital teaching aids are part of the homework of students. Searching on the Internet is used as a part of homework for 47 teachers in the range of up to 20% of homework in one class within the subject per month and for 21 teachers in the range of 20-40% of homework in the classroom per month.

Only 10 teachers stated that they do not use Internet as a part of students' homework, 32% do not use digital presentations as part of students' homework, and 31 teachers do not use online practicing (tests, dictations on the Internet) as part of students' homework.

The use of e-books and online educational games has been the least used digital devices in homeworks according to teachers' estimates. However, 41 teachers reported watching online videos as part of students' homework up to 20% of homeworks per month, 35 teachers reported the use of digital educational games and 34 teachers use of practicing curriculum in the form of dictations and Internet to similar extent.

According to the findings of telephone interviews, the directors of the schools estimate the digital access of students differently - part of the elementary school directors in Spišská Nová Ves said they did not perceive digital access to students as a problem, even in the case of students from a socially disadvantaged environment. Director of a school with 406 students and 49 of a socially disadvantaged environment, part of which comes from a segregated settlement : *"I was in the village, twice and wifi flicked everywhere .. TV and wifi that is what they have, even if they have nothing to eat ... they all have already"*. Differentiation between socially disadvantaged communities, especially Roma settlements in this area, is evidenced by the statements of other school representatives, according to the representative of the school in Spišské Hrhové, *"surely all students do not have Internet access at home"*. Similarly, differentiated views also appeared among representatives of the elementary schools in Nitra, where some school principals do not consider digital students' access to the problem and another part said some students do not have access to the Internet at home: *"some students do not have access to the computer, big differences ... there are also students of lonely mothers from*

the nearby Crisis Center, they do not have these options ... " According to the headmaster of the next school: "If they do not have the chance to do a computer job, we will give them an alternative and draw it".

What many school directors agree is the problem of the attitude towards the use of digital technologies as a learning aid (digital pedagogical ethos) that is associated with the pedagogical ethos as such: *"differences among are deepening, especially among uneducated parents"*. Another director remarked: *"they are no longer interested in computers, rather than mobile technologies ..."*. Digital pedagogical ethos of parents of students from a socially disadvantaged environment was expressed by the director of another school in Nitra using an example of parents' interest in information from the school and the way parents communicate with the school: *"they (parents, etc.) have mobile and Internet ... but rather interested facebook, others do not ... we communicate with them every day, we solve the problems of students, truancy only verbally "*.

Schools have several options to compensate for inadequate access to the Internet, as the choice of computer lessons that operate even in higher numbers due to students' interest (eg 2 at first and 2 at second level). According one of the school directors, computer lessons after school are often subsidized so membership is accessible to students and is of interest to them. The computer lessons after school in one of the schools were also accessible to parents.

In some smaller schools, computer lessons after school have not been set up. Other options include access to computer classes in the afternoon, Wifi available at school (morning until 7.30 am and afternoon from 1 pm to 5 pm), computer access at the school library. However, as it was said: *"students have access to computers in the computer room have, but what they do, whether or not there just to play, that's another thing ..."*.

Digital learning tools devices that are successfully used in one of the schools also include digital readers both in the library and in the classroom and laptops. According to directors, doing homework using the Internet is not perceived as a problem in most schools. In some schools, work with digital technologies takes place just before or just in the classroom and homework that includes access to Internet is being volunteered.

The objection of one of the directors aimed at moving the Informatics up to the third year of the original second, which slows down the development of fine motoring (work with the mouse ...) needed to work with the computer. School directors also stressed the importance of cooperation between the school and parents in the overall development of educational ethos students. The interest in digital technology alone may not be enough as a motivation for the use of digital technologies in a study, as the availability of other non - educational - digital applications can reduce the attractiveness of using digital

teaching aids among students with undeveloped digital pedagogical ethos.

Conclusion

Digital teaching aids have become a part of the educational process. Its benefits as well as limits are intensively being analyzed in current studies. With regard to the persistence of the socio-demographic digital divide in Slovakia, we focused on benefits and barriers of using digital teaching aids with students and students from a socially disadvantaged environment. The aim of our contribution was to monitor the use of digital teaching aids in schools with students with different socio-economic backgrounds. Based on the empirical data obtained on the sample of primary school teachers and directors we bring findings on the differentiated perception of digital access for students at elementary schools as well as several mechanisms of compensation for the lack of digital access of students at home.

According to the part of directors, the insufficient digital access of students is a significant obstacle in the context of using digital learning aids especially as part of homework. Also, the underdeveloped digital ethos of students from a socially disadvantaged environment can be identified as a significant barrier of the use of digital learning aids.

According to the primary school teachers, the digital pedagogical ethos that reflects readiness to use digital teaching aids, is being linked to "lack of education of parents". According to teachers, the most frequent barriers to using digital teaching aids include the insufficient digital access at schools especially in the area of internet connection quality, as well as lack of digital access for students in the home environment. Teachers are also aware of other limits on the use of digital teaching aids that are not directly related to material equipment as potential online distractors that can interfere in learning and preparing for school.

The positive benefits of using digital learning aids specifically for students from socially disadvantaged backgrounds according include the support of time effectiveness, interest, motivation, drifting, curriculum consolidation, corresponding to previous findings (R. Medved'ová, 2016, K. Cicko, 2010). Teachers' recommendations mainly concerned the improvement of material equipment in the area of digital access, the support of teacher training in the area and the creation of methodological materials for specific areas, such as consolidation and curriculum. The above findings can be supplemented by available expert findings, according to which it is necessary to "provide teachers with specific methodological support in a specific environment in schools with a higher number of students from socially disadvantaged backgrounds" (Klein, Rusnáková, Šilonová, 2012, p. 75).

There are several ways to compensate for inadequate digital access at schools, including the introduction of subsidized computer lessons in after

school club. To support the use of digital learning aids in the learning and homework preparation, creation of an organized learning space within which students with limited digital access could use digital devices may be considered. Future challenges include also the call for collaboration between IT development professionals and pedagogical specialists in preparing digital educational applications with a creative character, as well as in the development of didactic tools with a special focus on students with specific learning needs. Efforts should be directed towards compensating for the underdevelopment of the digital access and digital ethos that support the integration of students in the information society as well as achieving digital equality (Judge, Puckett, Bell, 2006, pp. 97-113). The attitudes of educators that can penetrate the wider social environment are particularly important. In the context of the EU's strategic objectives, the development of digital literacy (as a component of basic literacy) should be seen not only in terms of increasing employment opportunities but also in the level of support for integration and citizenship, as young people with low levels of education are less often active citizens and less participate in adult education.. Thus, support for the development of digital access and ethos of students in view of the persistence of sociodemographic digital divide can be formulated as one of the challenges of forming an information society in Slovakia.

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