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ANALYZING THE FACTORS INFLUENCING THE PRIMARY SCHOOL STUDENTS' DIGITAL LITERACY SKILLS DURING COVID-19 PERIOD

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Abstract

Digital literacy of primary school pupils is a much-debated issue. Some argue that it enhances the development of children at early stage of primary education; however, others are rather sceptical. The aim of this paper is to emphasize selected factors that affect the level of digital literacy of pupils in primary education. The presented study is conceived as a qualitative research with the usage of the case study method in its centre. The research was conducted during Covid-19 period in 2020. All respondents were born between 2009 and 2010. Families were deliberately chosen to copy the level of education attained by the distribution of this parameter in the Czech Republic. First, we provide the theoretical background to support our approach towards the research. A total of five children attending the fifth grade of primary school were included in the research. Subsequently, based on our results from qualitative research, we discuss factors that affect pupils' digital literacy. Findings of conducted case studies show that the way in which households are equipped with information technology devices influences the final digital literacy of pupils in the first stage of primary schools and, conversely, socio-demographic factors do not have an impact on pupils' level of knowledge and skills in the use of ICT.

Key words: *ICT in education, digital literacy, primary education, early school age, teaching ICT*

Introduction

The future of education is linked to technology. Therefore, most European countries consider incorporating the introduction of information and communication technologies (ICT) into their education systems as one of their priorities. New technologies are potential means of change and innovation. However, the implementation of technologies into education is related to a number of factors.

Today, the knowledge is produced and distributed with the generous help of information and communication technologies, and the result is the involvement of information and communication technologies in the educational process. The expectations associated with the entry of ICT into schools are considerable. The OECD report Learning to Change: ICT in School (2001) identifies the main reasons for implementing ICT as follows:

- Economic reasons - based on the perceived needs of the current and future economy. Knowledge of working with ICT is one of the important factors for success in the labour market. At the same time, modern technologies are seen as an opportunity for economic development.
- Social reasons - the ability to use ICT is perceived as a prerequisite for life in society in many ways. ICT competences are understood as a key skill.
- Pedagogical reasons - are based on the potential of ICT for teaching and learning, but also for school management, where modern technologies are perceived as an element that causes change and innovation in schools

Digital technologies are therefore an integral part of today. It is no different for early school-age pupils. Craft (2012) mentions the issue of developing creativity and independence within the digital age. On the one hand, technologies are perceived as dangerous, especially because of the content from which children should be protected. What is right is determined by adults, and children and youngsters are seen as consumers of what adults allow. On the other hand, technology is perceived by children as an element of empowerment and liberation, enabling children and youngsters to be active according to their needs and interests. Technology offers children unique opportunities to move

beyond the control of adults and to style themselves in different roles. Children thus become technically savvy.

In Australia, research has been conducted on children aged 9-11 who use a computer at home and at school with a much higher frequency than in other countries. They are thus exposed to risk factors related to the emergence and development of health problems that can be identified in other countries as well as adults. The research showed insufficient knowledge of children in the field of computer ergonomics (Tran, Ciccarelli, 2012).

Hsin, Li & Tsai (2014) deals with the view of the influence of technologies on learning. These authors offer, among other things, a typology of the relationship between technology and children's learning in their review article. Within this concept, they outline factors that influence children's learning. These include age, experience, the presence of modern technologies at home, time spent with technologies and also gender.

Arrow & Finch (2013) approach digital literacy from a different angle, in terms of similarities and differences in practices between home and school, including the development of literacy through digital technologies. The authors found out that the difference between teachers' digital literacy and their general literacy, which makes it difficult for children to develop digital literacy. Simpson, Walsh & Rowsell (2013) point to the development of digital literacy on a specific example of the implementation of tablets and iPads in teaching. Based on research, they state that by observing the interaction of students and the digital platform through touch, it is possible to follow navigation as evidence of the relationship between cognitive processes and the material being worked on, thus forming metatext consciousness.

Baron & Wright (2008) also have a similar positive view of the integration of technology into fourth-grade primary school teaching. Based on the experiment, they came to the conclusion that the implementation of ICT in education is effective. However, the authors point out that the essential part of any implementation is resources which include access to a sufficient amount of technology, time for teachers and students to learn to use new technology or applications, and generally have adequate technical support.

Chaudron et al. (2015) published a study focused on the qualitative monitoring of children aged 0-8 years how they work with technology and how parents mediate the

use of technology. The authors sought to identify the potential benefits and risks associated with the use of technology. The study involved 70 families from six European countries (including the Czech Republic). They state that the interaction of children with technology is shaped primarily by parents' approach, the relationship with older siblings, and the extended family. Most children possess basic operational and safety skills, some even have advanced digital competencies, but they all lack the maturity with which they can engage reflectively.

Cirus et al. (2019) examined the teachers' influence on the formation of digital literacy of primary school children. The research focuses on the extent to which informal education enables a pupil to master ICT and related technologies. The results showed a clear linkage of both sample groups (teachers and students) and the way how teachers perceive innovation and the development of their students' digital literacy. To attain this goal, preschool teachers should also be equipped with modern ICT know-how (Kabadayi, 2012; Kabadayi, 2006). The digital literacy is understood here as the ability to use information and communication technologies to search, verify, create and transmit information requiring cognitive and technical skills (Digital literacy, 2013).

Method

The presented study is conceived as a qualitative survey with the usage of the case study method in its centre (Cresswell, 2014). This approach was chosen with respect to our intention to explore in-depth what factors influence the development of digital literacy of pupils in their home environment.

The primary goal was to identify active and passive factors that may affect the teaching of students in subjects related to ICT.

An individual case study was chosen as the main research method (Yin, 2011). Within the description of individual cases, the use of a supportive method was used as a semi-structured interview, observation and, to some extent, a family history of socio-cultural background.

A total of five children attending the fifth grade of primary school were included in the research. The research was conducted during 2020. All respondents were born

between 2009 and 2010. Families were deliberately chosen to copy the level of education attained by the distribution of this parameter in the Czech Republic. The method of selecting the research set was therefore designed as a qualified intentional selection. In order to make findings as accurate as possible and to reveal the real state of pupils' knowledge, the research was carried out in a neutral environment, i.e. being unknown for pupils.

The evaluation of the obtained data was performed by standard methods of qualitative survey. What relates to interviews, they were transcribed, analysed on the basis of an inductive approach, where the data were first decoded and then processed using coding, while the open coding method was applied. Within observation and family history, findings were categorized based on relationship analysis (Silverman, 2013).

The ethical level of the research survey was ensured by the informed consents of all participants; in the case of children, the consents were expressed by legal representatives. All respondents were informed in advance about the purpose of the research survey and about the method of data analysis and following interpretation. As part of the work with the data, and especially with its publication, the findings were strictly anonymized so that it was not possible to identify the examined subjects. The names mentioned in the article are fictitious. To ensure the validity of the findings, independent data processing by the authors of this text was used, while the presented results are the result of a discussion of all researchers.

Table 1 shows that all examined pupils are mobile phone owners. Clear differences are already visible in other equipment and its use. Only one of the pupils has his/her own tablet and the other two own this technology together with their sibling. Furthermore, none of the children has their own laptop and two of the children do not even have any such device within the family. What concerns desktop computers, we can see that households are better equipped. The desktop computer is owned by four of the total number of interviewed families. However, only one of the children owns his own personal computer.

Results

The first area we focused on was the availability of ICTs at home.

Table 1 – The availability of ICTs in the household

	Kateřina	*Lukáš*	*Monika*	*Ema*	*Viktorie*
Mobile phone	YES	YES	YES	YES	YES
Tablet	YES with brother	NO	YES	NO	YES with sister, family's
Laptop	Family's	NO	Family's	Brother's	NO
Desktop Computer	Family's	Family's	NO	YES, family's	Family's
Activities on ICT	Searching, watching documents and educative programs	Games	Youtube videos, games	Youtube videos, messenger	Youtube videos, cartoons, games

Furthermore, it is also worth noting how these devices are used. It is interesting that only one child stated that he/she uses ICT for studying and searching documents. Other children mentioned the use of ICT mainly for watching videos on Youtube, playing games and communicating through social network. Nevertheless, it must be acknowledged that even these activities support to some extent the development of children's computer literacy.

This table shows that schools of our examined pupils provide modern equipment. Only one of the teachers uses the interactive whiteboard every hour. Most teachers use an interactive whiteboard and a Data projector not only to project, but also to work with students - completing, drawing, sorting pictures / words, etc.

Most teachers also give the opportunity to pupils to make presentations on a given topic using ICT. This option is used by only half of the pupils, whose parents help with the creation (especially inserting pictures). Furthermore, the school offers a computer club where pupils can improve their computer skills.

Table 2 – The availability of ICTs at school

	Kateřina	*Lukáš*	*Monika*	*Ema*	*Viktorie*
Interactive whiteboard / Data projector	Interactive whiteboard	Data projector	Interactive whiteboard	Interactive whiteboard	Interactive whiteboard
- Using during lessons	Every lesson	Every day	Almost every lesson	3x per week	Almost every lesson
Essays, Homework using ICT	YES, voluntary	NO	YES, voluntary; YES (English teacher)	YES, voluntary	YES, voluntary
- pupil's usage	YES, pictures with help	X	NO	NO	YES, pictures with help
ICT lesson	Difference HW, SW, work with Word	Work with Word	Description of PC in a traditional classroom	NONE – lessons are in 2nd and 3rd grade of primary school + Computer club	Description of PC, work with Drawing app.

The results show that computer competencies are very diverse among children. The biggest problem was the phrase "graphic editor". Only one out of the five children knew what the term means. Another problem was the presentation.

Although this knowledge is included in the curriculum for the lower-secondary students, teachers regularly give fifth-grade pupils the opportunity to present their work in this form. Therefore, we included this task into the survey. None of the students was able to promptly complete the assigned task. Only one child was able to somehow get orientated in a new environment. Furthermore, the pupils were asked to save all their finished work into a newly created folder. Only one student was able to save the document, presentation and output of the painting in her already created folder after thinking about the process. At the same time, pupils struggled with the search of the calendar application and its subsequent work. Two pupils started to look for the given date on the Internet.

Table 3 – Pupils' ICT skills

	Kateřina	*Lukáš*	*Monika*	*Ema*	*Viktorie*
Switch on	YES	YES	NO	YES	YES
Switch off using Start Menu	YES	YES	YES	YES	YES
Folder creation	with help	Created document, then folder with help	with help	YES	YES
Graphic editor	Didn't know how, good orientation	NO	She found out what it means after longer period	YES	Didn't know how, good orientation
Text editor	YES	YES	with help	YES	YES
- Writing	4 fingers, faster	4 fingers, slow	3 fingers, slow	4 fingers, faster	3 fingers, slow
- Numbers, capitals	YES	Remembered after longer period	NO	YES	YES
- Diacritic	YES	NO	NO	YES	YES
Presentation	Problematic slide creation	NO	NO	Basic operations	Problematic slide creation
Saving into new folder	NO	NO	Can't find the place for saving	She managed on her own after a longer period	NO
Closing a pro-gramme	YES	YES	YES	YES	YES
switching between windows	YES	NO	NO	YES	YES
Double click	After a longer period of time	YES	YES	YES	NO
Memory card	YES	YES	YES	YES	YES
- copying folder	NO	YES	NO	YES	YES
Check battery status	YES	YES	YES	YES	NO
Calendar	NO	YES	NO	NO	YES
- orientation	Good orientation	NO	NO	NO	YES
Game	YES	NO	with help	YES	YES

The third pupil manually calculated the date of birth of his relative and forgot about the application. Only one child knew where to find the calendar and how to use it.

Conclusions & Discussion

Within the individual examined blocks, it was found that the greatest influence on child has the ownership of a desktop computer or a laptop. Pupils who possessed their own or a family computer or a laptop with unlimited access had much better orientation and completed the individual tasks.

From the results of the survey and testing on a laptop, it was found out that the fact of spending free time has a greater influence on the ability to control ICTs than the number and time effort dedicated in clubs. In other words, the fact that children do not spend so much free time at the computer does not mean that their ability to work with ICT will be lower than of those who spend their time playing, for example, playing computer games. Kateřina, who attended six clubs, handled the laptop as well as Ema, who was enrolled in two clubs. On the other hand, Lukáš, who claimed to attend four clubs and watch TV in his free time or when being with friends, controlled the computer very slowly. Monika, having been assigned in three clubs and filling up her free time with hand-made, drawing and painting activities, had the worst results in operating laptop. Despite her claiming of using tablet in her free time, she could not control her laptop. This leads us to a deduction that if we wish to develop pupils' ICTs competences, the child should be able to access a laptop or desktop computer. Similar conclusions are drawn by Bjorgen & Erstad (2014), who also point out how teaching ICT in school can influence children's leisure time.

Another prerequisite for the pupil's development in the field of ICT control is a well-equipped classroom. Relatively poor equipped classroom was the case of only one of the examined schools in which pupils could make use of only data projector. Lukáš was the only pupil who did not have the opportunity to prepare his work in presentations, however his teacher tried to use the data projector every day. Ema and Monika, who had the opportunity to prepare presentations for the lesson, did not make advantage of it. In addition, Monika did not have any practical computer training at school. On the contrary, Victoria and Kateřina, who were also encouraged to prepare presentations of their work using ICT, tried it. Based on interviews, they searched for the information by themselves, only the insertion of pictures was done with the assistance of their parents.

Moreover, they both had a problem adding a new slide in the presentation, on the other hand, they managed other partial tasks without any problems. Referring to our findings, we can conclude that the classroom equipment does not have a significant impact on pupils' involvement. More important is the teacher's approach to this equipment and the opportunities that the teacher prepares for students. Thus, the most important factor would be offering lessons of ICT for primary school pupils. Similar conclusions were stated, for example, by Flewitt, Messer & Kucirkova (2014), who pointed out the importance of equipping classrooms with modern technologies.

Factors such as the age of the parents, the place of residence or the education of parents did not prove to be relevant. Comparing all the above information, it is possible to find out that a pupil with the biggest issues in completing the tasks in the survey, did not have a desktop computer in the family and used the laptop only to complete school assignments. She was using a tablet and a mobile phone for searching videos and games. Due to this rote usage of devices and insufficient access to more demanding tasks, Monika performed slowly and had troubles with the accuracy of writing, incl. accents, writing numbers, uppercase and lowercase letters. Another factor that affects her level of ICT knowledge is the absence of ICT lessons which were cancelled due to the reconstruction of the special computer classroom. We should not forget about other factors that may influence Monica performance with ICT. This would be her interests and the way how she spent her free time. Monika attended only 3 after-school clubs, which were, however, more time-consuming than the clubs of other examined children. Her leisure activities outside these clubs took also much of Monika's time as she was immersed in them every day. Above that, it is the importance of parental involvement which impacts the development of child's digital competences. For example, Romero (2014) highlighted the importance parents' attitudes - positive or negative – in the usage of ICT. The author claimed that it had a significant impact on shaping children's digital competencies.

On the other hand, a pupil – Ema - who had a desktop computer freely accessible in her room performed best. Ema controlled and get quickly used to an unknown operating system. The only task she was unable to complete was to handle the calendar. She regularly communicates with her classmates via Internet communicators on a mobile phone or computer. Thus, we assume, she writes relatively quickly using accents,

capital letters and numbers. Another factor that influences her level of ICT competences is the fact that she attended computer lessons in the second and third grade of primary school. Despite the fact that Ema did not continue with the computer lessons in the following years, we may deduce that she had created a good base for further development and self-training. The frequency of clubs and leisure opportunities are another important factor influencing Ema's performance. She attended only two after-school clubs and the only leisure activity she mentioned were being outside far from a computer or any similar device.

Recommendations

The presented results show that working with ICT at an early school age is an inevitable process, not only due to the implementation of the basics of ICT in the national curriculum. The development of technology affects the whole of society, and the technologization of life is, even though it may be difficult to accept, an inevitable part of the current development of society.

For schools and teachers, this means adapting to this trend so that the school continues to fulfil its educational function in the context of state-of-the-art cultural and social requirements. However, families must not be left out either, as the above results have proven. For this reason, there is also a greater demand on the state which should be able to eliminate inequalities in access to education and allow children to gain competences for their future.

Based on our findings, several recommendations can be formulated. First of all, it is an appeal to the state institutions responsible for the implementation of educational policy to further promote equal access to education, especially to be able to actively prevent situations where the socio-economic status of the family does not allow access to modern technologies at home. In particular, these are single-parent families, families from socially excluded localities or low-income families.

Recommendations for schools, which are now relatively well equipped with modern technologies, can be directed primarily to improving the quality of teaching, which should focus on acquiring digital literacy, especially with regard to the develop-

ment of students' computer thinking and the functional use of modern technologies. including an understanding of the risks associated with the use of ICT.

The last recommendation can be formulated for teachers, especially with regard to their digital competencies. The field of ICT is very dynamic, and teachers are not always able or willing to learn new technologies or methodologies on how to work with technologies in primary education. And yet, the development of pupils' ICT competences depends, to some extent, on teachers' digital competences and their approach to ICT. Thus, we would encourage and highly recommend teachers to educate themselves and try to be up to date with new technologies.

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