Investigating Parents' Attitudes towards Digital Technology Use in Early Childhood: A Case Study from Croatia

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Abstract. The aim of this study is to investigate perceptions of parents in Croatia towards advantages and disadvantages of computer use in general as well as their children's computer use and to reveal parents' concerns and opinions about digital technology (DT) education in kindergarten. The paper reports on research findings from one of the large public kindergartens in the capital city of Croatia. A total of 152 parents of the children aged 3 to 7 enrolled at this early childhood education institution filled in the survey. Results show that although being very well equipped with digital technology hardware at home (99% of surveyed parents owns a computer, tablet or smartphone), parents feel anxious and are not always willing to allow their children to use DT. Results of our survey reveal young children's ability to use DT, but they also show that mere possession of DT at home and enabling children to use computers does not guarantee development of computer literacy and/or information literacy skills.

Keywords: early childhood education, kindergarten, computer literacy, information literacy, digital literacy, parents' attitudes, children's DT use, DT education.

1. Introduction

Unlike their parents, contemporary Croatian children were born in a completely computerized world.

Children's experiences of using technology are part of their everyday life, and must be taken into account as part of an appropriate development framework. Digital tech-

nologies inevitably affect people (family members, caregivers and educators in early childhood) and environment (physical and social) that surrounds young children. Furthermore, digital technologies represent new opportunities to enhance many aspects of the practice of early childhood education, such as children's learning experiences and play, professional learning, relationships and communication between early childhood education institutions, parents and other people.

New digital technologies increase the opportunities for learning, but can also be a source of potential risk.

As a consequence, parents sometimes have various misconceptions and stereotypes, which, in Croatia, are often based on negative reports in the media about the harmful effects of DT on children. Such reports make parents concerned, anxious and frightened that their children, if exposed to computers in kindergarten, will play aggressive and violent computer games, instead of learning, creative play and socializing with their peers.

Generally, concerns about the introduction of DT in early childhood education are mainly focused on the impact of the DT use in the early childhood to the cognitive, emotional and social development of children and their developmental needs.

In the context of Croatia, these concerns perhaps coincide with the presence of generational digital divide, which still exist in families. Although parents of kindergarteners belong to the group of people who were already born in the digital era (the majority of parents that we surveyed was between 30 and 39 years old), their participation in that era can hardly be compared to that of their contemporaries in some other countries. The most recent Eurydice survey *Adult Education and Training in Europe* (2015) showed that 40% of Croatian citizens aged 25–64 either never used a computer or performed DT related tasks. Thus, many of kindergarteners' parents in Croatia still find themselves on the other side of the digital divide and, consequently, often fear that they will not be able to help their children in the field of DT, or that they will fail to protect them from threats in the digital environment. They are also worried that they will not understand why and how their children use DT in kindergarten.

In order to become involved in the process of DT integration in institutions of early childhood education, parents need to be aware of what their children are doing on computers at home. Also, to achieve educational goals, early childhood educational institutions should seek to effectively use children's experiences with DT at home. Therefore, as part of our study, we surveyed parents of children enrolled in one of the large public early childhood educational institutions in the capital of Croatia to find out what children are doing on computers at home, and to reveal whether their parents are aware of these activities.

2. Benefits, Dangers and Risks of DT Use in Early Childhood – Literature Review

The role of technology in early childhood education, from birth to seven years of age, is the subject of divided opinions. One group of experts advocates the introduction of DT in early childhood with the assumption that it facilitates learning and development.

Another group refuses the introduction of DT, claiming that it hinders the healthy development of the child in the early years. Proponents suggest that children should take advantage of all benefits that new technology can offer. Critics are concerned that, despite exciting and potentially valuable children's experiences with computers, they do not use DT tools in the best possible way or that they do not achieve expected results (Healy, 1998). They also argue that children of that age should not use technology as a learning tool, since it moves them away from childhood and a play that has to be dominant in this period of the child's life. Looking at these arguments, some authors point out that very similar concerns for adverse cognitive, emotional, physical and social effects on children accompanied the emergence of any new technology since the invention of the press, to the proliferation of film, television and video games (Linderoth, Lantz-Andersson and Lindstrom, 2002; Luke, 1999).

Possible negative effects of excessive DT use are overweight and obesity. Scientists who advocate for the prevention of overweight and obesity in children (Birch, Parker and Burns, 2011) recommend to set limits for time spent in front of the screen (including television screens, mobile phones, etc.) for children (aged 2 to 5) to less than one hour a day. In addition, professionals are encouraged to work with parents to limit children's exposure to screens, as it contributes to obesity in early childhood (Schepper, 2011).

Educators and parents warn of the negative impact of television (Kirkorian, Wartella and Anderson, 2008; AAP 2011b), passive use of screens (AAP, 2011b) and the relationship between media and childhood obesity (Birch, Parker and Burns, 2011; Schepper, 2011). Generally, researchers emphasize that although the amount of time children spend on screens is important, the way in which they spend this time must also be taken into account in determining what is effective and appropriate for them (Christakis and Garrison, 2009; Vandewater, Rideout, Wartella, Huang, Lee and Shim, 2007; Tandon, Zhou, Lozano, and Christakis, 2011).

Additional possible negative effects are irregular sleeping, problems with focusing and with attention, negative impact on socialization and language development (Cordes and Miller, 2000; Appel and O'Gara, 2001; Brooks-Gunn and Donahue, 2008; Lee, Bartolic and Vandewater, 2009; DeLoache, Chiong, Sherman, Islam, Vanderborght, Troseth *et al.*, 2010; Tomopoulos, Dreyer, Berkule, Fierman, Brockmeyer and Mendelsohn, 2010; AAP, 2011b).

Calvert (2006) also writes about potential negative effects of DT use on children's social, cognitive and emotional development.

Fomichova and Fomichov (2000) add another dimension to this argument by suggesting that children in developed countries spend so many hours alone in front of the computer that they obtain a new family, consisting of parents, children and computers.

Other researchers write about negative consequences of DT use in education – digital equity and digital divide (Judge, Puckett and Cabuk, 2004; Judge, Puckett and Bell, 2006), emphasizing that use of DT in education may exacerbate inequality. Solving these inequalities in early childhood represents an important factor in deciding when and how to introduce DT in the educational program. In the early 1960s, literature on the early childhood education emphasized the differences in access to print media for

children from different economic backgrounds. Today, parents face similar challenges with DT tools, media and internet access. Children who grow up in wealthy families are more likely to have access to DT tools and the internet in their homes, they begin to use the internet at an early age and have highly developed DT skills when they go to school. Children growing up in less wealthy families may have limited access to DT which leads to potential risk of increasing inequities between these groups (Burdette and Whitaker, 2005; Calvert, Rideout, Woolard, Barr, and Strouse, 2005; Cross, Woods and Schweingruber, 2009).

Contemporary literature (Mendonça, Crespo and Simoes, 2015; Ragnedda and Muschert, 2013; Warren-Sams, 1997) speaks of more areas of potential inequities in the use of DT: access, type of use (basic skills or complex capabilities) and the educational curriculum. Access to digital technologies largely depends on the quantity and quality. Differences in funding mean that children of parents with lower incomes and children from ethnic minorities have limited access to DT and are often limited in the types of programs and the purpose for which the DT is used. Ragnedda and Muschert (2013) point out that digital inequities among parents reinforce inequities among children. The mere access to digital technologies does not ensure equal learning opportunities for young children and, therefore, researchers write about the second-level digital divide where children have equal access to digital technologies and use them frequently, but differ in digital skills and opportunities taken online (Ragnedda and Muschert, 2013). Therefore, the second-level digital divide refers to inequities among those who already adopted digital technologies (Warschauer, 2003; Hargittai, 2010, D'Haenens and Ogan, 2013). All children deserve the opportunity to benefit from the use of technology that provides a rich experience. The use of technology should be part of the educational curriculum, and not for the benefit of only some children, or as a reward for good behavior.

Finally, although researchers warn that the lowest age of children playing video games has moved to 2 years of age (Granic, Lobel, and Engels, 2014), "there has been little systematic research on the long-term influences of interactive game play, and especially limited attention given to young children." (Wartella, O'Keefe and Scantlin, 2000) These authors mention the results of the small, but relevant number of studies that analyzed the short-term impact of violent video games on children aged 4 to 10. Results reveal that those games encourage "immediate increases in aggressive behavior, attitudes and thoughts – but only in the short-term" (Wartella, O'Keefe and Scantlin, 2000).

Regarding the benefits of DT for young children, there are two major benefits that can be drawn from the analysis of the research on brain development. This research has focused attention on the cognitive abilities of young children, phases and styles of their learning, their social and emotional development and successful educational practice. Firstly, digital technology can help children to visualize difficult concepts. Secondly, new interactive technologies facilitate the creation of an environment in which children can learn through action, providing them with the opportunity to create and explore.

A study by the National Research Council's (Bransford, Brown and Cocking, 1999) suggests that young children lack knowledge and experience, but not the reasoning abilities. It emphasizes that many features of new technologies are in line with the principles of new scientific achievements.

DATEC (Developmentally Appropriate Technology in Early Childhood) project, which aimed to develop cross-national understanding of developmentally appropriate use of DT and appropriate DT educational curriculum, identified seven general principles for determining the effectiveness of DT uses in the early years (Siraj-Blatchford and Siraj-Blatchford, 2000). Adopting these principles should "ensure the educational purpose of DT uses and encourage collaboration as well as integration of DT within curriculum. It should also ensure that the child is in control, while parental involvement needs to go hand-in-hand with these principles. Finally, educators and parents using DT with young children should choose transparent applications and avoid ones containing violence or stereotyping and should be aware of safety issues" (Siraj-Blatchford and Siraj-Blatchford, 2000). The project also tried to disseminate exemplary uses of DT with young children in a range of European settings.

Finally, empirical reports show that carefully planned integration of DT in other activities that meets all important needs of childhood may provide many opportunities for social interaction (Bergin, Ford and Hess, 1993; Clements, 1994; Lipinski, Nida, Shade and Watson, 1986; Brown and Harmon, 2013). Computers and other DT tools can be used to support and encourage the development and learning of young children. In order to understand the impact of DT on children's development, a balanced perspective that considers both the possible positive and negative effects is needed.

Discussion of the advantages and disadvantages of using DT in the early years remains opened, but no one can definitely claim that the early introduction of DT is completely beneficial or completely harmful for children, because there are far more questions than answers about the influence of DT on the social, intellectual and physical development of children. The research results remain divided and therefore can be confusing for both teachers and parents.

However, we can say with a high degree of certainty, that DT in early childhood education can effectively support and enhance learning experiences and games, if its use is socially and developmentally appropriate. The potential of positive effects of the DT use is large, as long as it is based on the principles of child development.

3. Methodology

In this study, we surveyed parents of the children aged 3 to 7 enrolled at formal early childhood education institution. The survey instrument was developed to determine the attitudes of parents about computer/ information / digital literacy education in kindergarten and their attitudes about educative workshops for parents that would instruct them on the positive and negative impacts of DT in early childhood. We also intended to gain a deeper understanding of parents' perceptions toward the use of computers by their children at home, to reveal their concerns and how to address them.

Computer literacy "refers to the ability to use computers and related technology – such as software and hardware devices – with a certain level of efficiency", while information literacy "describes the act of locating, interpreting, organizing and sharing information in such ways that it is meaningful not only to the communicator but also the audiences who are intended to receive it" (Summey, 2013). Computer literacy focuses on use of computers and related technology, while information literacy refers to a cognitive process that (not necessarily) employs DT tools. Computer literacy and information literacy have nowadays merged and formed digital literacy, which is defined by Paul Gilster (Pool 1997: 6) as "the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers". According to Gilster, digital literacy focuses on "mastering ideas, not keystrokes".

Therefore, parents' attitudes towards digital literacy education in kindergarten were the main focus of our study.

The survey was developed by the coordination of early childhood education experts, kindergarten principal and digital technology expert. Our aim was to determine whether parents possess PC, smartphone or tablet in their household, examine their attitudes on the use of computers by their children as well as their personal preferences regarding the use of computers, internet and DT in general.

The survey instrument designed to measure parents' perceptions and attitudes was a questionnaire with seventeen questions: 13 questions were close-ended with unordered response categories, while 4 items were close-ended questions with ordered response categories (Likert scale questions). The survey included a cover letter where parents were guaranteed anonymity and confidentiality and instructed to fill in the questionnaire by themselves at home. The instrument was distributed to parents during one week by kindergarten educators in charge of their children.

Respondents of the survey (a total of 152 respondents) were parents whose children were enrolled in one of the large public early childhood educational institutions in the capital of Croatia. This kindergarten had 486 children enrolled and 85 educators in charge of those children in 2014. It conducts its regular activities at three locations in Zagreb and represents multi-religious environment that stimulates the development of preschool children by introducing modern educational standards and 9 different programs (e.g. English language program, Montessori, etc.). Table 1 shows the parent's gender and the family role. The largest number of questionnaires were filled by mothers and their responses constitute 71.7% of parents' questionnaires. Fathers have filled a

Table 1
Parent's gender and the family role

Role	N*	%
Mother	109	71,7
Father	42	27,6
Someone else	1	0,7

*Note: N –number of respondents

total of 27.6%, while one questionnaire was filled by a person who had some other role in the child's life.

Parents who completed questionnaires varied by age (Table 2) and thus, the majority (64.4% of them) had between 30 and 39 years, while only 1.4% had more than 50 years. The percentage of parents who were 29 years old or younger was 14.4%, while parents between 40 and 49 years of age were represented slightly higher in our sample (19.9%).

As presented in Table 3, parents are mostly part of the four-person families (47.7% of them), followed by the three-member family (29.1%). A relatively small share in the distribution of the number of members in the family make the five-member families (8.6%), followed by the six-member families (6.6%), two-member families (6%) and seven-member families (1.3%). Only one ten-member family was found in the sample, which makes the share of 0.7%.

4. Results

This chapter presents detailed results of the empirical research on parents of children enrolled in a large public early childhood educational institution in the capital of Croatia. Analyzing the possession of computer, tablet, smartphone or similar devices in the fami-

Table 2

The age of the parent

Age	N	%
<= 29	21	14,4
30–39	94	64,4
40–49	29	19,9
50+	2	1,4

Table 3

The distribution of the number of members in the family

N of family members	N	%
1	1	0,7
2	8	5,3
3	44	29,1
4	72	47,7
5	13	8,6
6	10	6,6
7	2	1,3
10	1	0,7

lies of parents who filled out the questionnaire, we discovered that only one family does not own such devices (99.3% of respondents gave affirmative answer to this question).

As a source of household income (Table 4), the majority of respondents indicated a steady full-time job (73.5%), a smaller number had a contract of limited duration (10.9%) or were freelancers (2.6%). The remaining number of parents (12.9%) stated different combinations of income sources in their household (pensions, social assistance, part-time job and maternity allowance).

Occupations of parents who answered the questionnaire (Table 5) were very diverse and numerous – the majority of parents have administrative occupations (15.44%) or work in private enterprises (14.71%). A relatively large number of parents (21.32%) chose "other" category, where they listed very different professions such as trader, banker, lawyer, and many others. The highest degree of education (Table 6) obtained for most parents was a high school diploma (43.7%). Further 31.85% held a master's degree, while only 1.48% had obtained a master of science degree (university postgraduate pro-

Table 4

The source of household income

Source of household income	N	%
Full-time job	114	73,5
Contract of limited duration	17	10,9
Part-time job	4	2,6
Pension	0	0
Social assistance	0	0
Maternity allowance	0	0
Child benefits	0	0
Paternity allowance	0	0
Combination	20	12,9

Table 5

The occupation of the parent

Occupation	N	%
Journalist	3	2,21
Management	7	5,15
Computing and Electrical Engineering	10	7,35
Mechanical engineering	3	2,21
Administrative occupation	21	15,44
Art and Design	0	0,00
Education and childcare	10	7,35
Health and social care	8	5,88
Tourism and Hospitality	10	7,35
Government sector and NGO's	15	11,03
Private enterprise	20	14,71
Other	29	21,32

gram leading to a Master of Science (MSc) existed until year 2003 and belonged to the third level of higher education – it was part of the PhD study).

Parents also listed the computer software for children they possess in the household (Table 7) and results show that educational software *Sunčica* (which is the first and the oldest educational software in the Croatian market) was present in very large numbers of households (89.92%). A small number of parents (9.24%) reported that they possess the computer software *Mala učilica*, while only 0.84% of them have computer software *Hlapić* available at home for their children.

Regarding the interactive software for children aged 4 to 8 years listed in Table 7, *Sunčica* (`http://www.32bita.hr/`) is the oldest one. It was created in 1999 and is one of the most recognizable products in Croatian language. Sunčica is the main character which communicates with children and encourages them to learn the basics of reading, to acquire basic math concepts and learn about nature, music, space, transport, Croatia and Europe. *Sunčica* is available on CD, Smart TV and Android mobile devices.

Sunčica među slovima (Sunčica among letters) contains five different games for learning letters of the Croatian alphabet: *Slovarica* (Spelling book), *Spremalica* (Storage), *Slagalica* (Puzzle), *Bojanka* (Coloring Book) and *Memo*. *Slovarica* is the central game. At the bottom of the screen children can find the complete Croatian alphabet, while letters and pictures of words that begin with the specific letter appear in the notebook which is placed above the alphabet. In the basic mode, the first letter of the each word is displayed and spelled to the child, followed by the picture of the word. *Memo* is a game where children connect the initial letters of words with images of these words. In addition children can connect the same uppercase and lowercase letters. The images

Table 6

The highest completed degree of education of the parent

Degree	N	%
Completed elementary school	3	2,00
Completed high school	59	43,70
Completed vocational	12	8,88
Undergraduate degree / bachelors (3y)	10	7,41
Graduate degree / masters (5y)	43	31,85
Master of science	2	1,48
PhD	6	4.44

Table 7

Possession of the educational computer software

Educational computer software in the household	N	%
Sunčica	107	89,92
Mala učilica	11	9,24
Hlapić	1	0,84

that are displayed can be created by children, which adds a new dimension to the game. *Spremalica* is a game in which children store the given image in the box that is labeled with the initial letter of the object in the image. *Slagalica* offers letters in a mixed sequence that need to be arranged properly in order to represent the word for the object in the image. After the submission of the sequence of letters, children can click on the image of the main character *Sunčica* and listen to the pronunciation of the assembled word, verifying if they have put letters in the correct order. *Bojanka* is the easiest game where the emphasis is on creativity of the child. It offers more than 30 different drawings and children can also paint their own drawings. *Sunčica među brojevima (*Sunčica between numbers*)* contains different games for learning numbers. In accordance with the age and knowledge of the child, the software can be customized. For example, a parent may choose one of four groups of numbers – from 1 to 5, 1 to 10, from 0 to 10 or from 0 to 20 and then all games contain only numbers from the selected range.

Mala učilica (`https://www.youtube.com/watch?v=Zg7Oyb2Dgec`) is the educational software for preschool developed in collaboration with early childhood education experts. The software teaches children letters, numbers, days and seasons of the year, family tree, traffic signs, colors and spatial relationships through the imaginative world of characters such as heroes, wizards and kings. All activities are suitable for children aged 4 to 7. Successfully solving the given problems children build a sense of relevance and effectiveness, thus contributing to the development of the positive self-image.

*Učim slova i brojeve s Hlapićem (*I learn letters and numbers with Hlapić*)* is another interactive software with a variety of games for children aged 3 to 8 years. Games help children in learning Croatian alphabet letters and numbers. Playing with Hlapić and his friends, children learn to recognize letters and numbers, to count, to recognize colors and geometric shapes and to discover relationships between objects. They also learn to perceive the opposing concepts, simple math operations (such as addition) and to put the letters in the correct order to form a word. Most games offer easy and advanced level, while some games contain version for two players. As is the case with the previously described software, the emphasis of this software is on games that encourage the development of child's mathematical skills.

*Učim engleski s Hlapićem (*I learn English with Hlapić*)* is entertaining and educational software for children aged 5 to 6 years that assists them in learning English language. Interactive picture dictionary is divided into four units, each containing a few simple games designed for easier acquisition of the new vocabulary. Interacting with Hlapić's friends, Alice and Sam, children learn concepts from the world around them in English language.

Analyzing parents' views about the advantages and disadvantages of computer use in their everyday lives (Table 8), we discovered that the majority of them recognizes and highlights the value of computers, cell phones and internet.

Parents' most neutral attitudes represent a great source of insights into their concerns and fears regarding the development od DT and its role in their lives, which might be perceived as a reason for growing alienation of the individual in the modern society. These attitudes indicate their awareness of both useful and dangerous content on the internet and the issue of user's careful content selection.

Table 8

Parents' attitudes towards the advantages and disadvantages of computer use (1=strongly disagree; 2=generally disagree: 3=neither agree nor disagree; 4=generally agree: 5=strongly agree)

	1	2	3	4	5
It would be hard to live without computers.	8,7	4,7	30	20	36,7
Internet is a global evil.	36,2	17,4	33,6	9,4	3,4
I am thrilled with the ease of communication through internet with anyone in the world.	2,7	2,7	25,5	30,2	38,9
Frequent use of personal computers makes people stupid.	28,4	20,3	27,7	13,5	10,1
I consider using the internet as joining pleasure with usefulness.	3,5	4,9	30,6	34	27,1
Due to the aggressive video games, nowadays more and more people have problems with the restraint of aggression and anger.	7,4	10,7	25,5	23,5	32,9
I believe that computer and cell phone have significantly speeded up and facilitated the work of busy people.	2,7	3,4	10,7	30,9	52,3
The development of modern technologies leads to alienation and the collapse of society.	13,5	13,5	41,9	18,9	12,2
I can meet new people on the internet.	11,9	16,8	34,3	20,3	16,8
Internet leads to excessive isolation of children and adults because they spend too much time using it.	8,8	9,5	31,1	28,4	22,3
Searching the internet is fun.	3,4	4,1	38,8	29,3	24,5
I rarely use computer in my free time.	18,5	17,8	30,8	17,8	15,1
Internet helps me to be informed.	2,7	4,8	21,2	25,3	45,9
Cell phone should be used for emergency calls only.	32,9	17,1	24	19,2	6,8
Modern technologies have significantly improved people's lives.	2,7	8,2	34,9	27,4	26,7
There is more dangerous than useful content on the internet.	19,7	17,7	44,2	12,2	6,1
Computers facilitate learning.	2,7	6,2	31,5	30,8	28,8
Social interaction among people reduced with the development of DT.	8,1	9,5	30,4	28,4	23,6
Despite all dangers, I believe children should be taught how to use internet.	1,4	4,1	17,6	33,1	43,9
Use of DT gradually leads to the impoverishment of the vocabulary.	10,1	20,1	31,2	24,8	14,8

Despite the fact that 99% of surveyed parents stated that they own a computer, tablet or smartphone, less than half of them (46.51%) make these devices available to their children at home. This might be connected to their concerns on the impact of the computer use to the cognitive, emotional and social development of their children.

Furthermore, we investigated the opinions od parents about introducing digital literacy education as part of the educational program in kindergarten. A large number of parents (84.67%) supported this form of learning in kindergarten. We also examined the opinions of parents about the usefulness of the workshop that would instruct them on the positive and negative impacts of DT in early childhood, which would be held in kindergarten. A relatively large number of parents (75%) expressed their desire to participate in such educative workshop.

Parents also expressed their opinions about the advantages and disadvantages of computer usage among children (Table 9). Despite the potential dangers of the computer use in the early years that parents generally agree on, the majority of them believes that children should gain valuable DT skills and should be educated on how to use the DT.

Table 9

Parents' attitudes towards the advantages and disadvantages of children's computer use
(1=strongly disagree; 2=generally disagree: 3=neither agree nor disagree; 4=generally agree:
5=strongly agree)

	1	2	3	4	5
Children learn new and useful things on computer.	3,5	6,3	27,8	39,6	22,9
Children who regularly use computer are at risk of developing dependence.	5,4	4,1	30,4	31,8	28,4
When using computers, children gain valuable IT skills which will be useful for them in the future.	2	2,7	21,6	42,6	31,1
Computers can have only negative influence on children's development.	38,1	25,2	26,5	10,2	0
Instead of playing with peers, children spend their time on the computer.	12,5	7,6	37,5	22,2	20,1
Children can better develop their skills playing computer games.	14,2	18,9	41,9	16,9	8,1
Children engage in sport less frequently due to the increased computer usage.	9,7	9	25,5	20	35,9
Excessive use of computers may separate children from their parents and friends.	8,1	10,1	31,1	22,3	28,4
Thanks to computers, children's intellectual development is enhanced.	6,8	14,3	43,5	23,1	12,2
Children spend more quality time on the computer than watching TV.	8,8	12,8	45,3	24,3	8,8

Also, they are very well aware of the negative effects of computer use on the children's engagement in sport and other physical activities, but the majority of them denies the exclusively negative influence of computers on their children. Again, their most neutral attitudes represent a source of insights into their concerns regarding the effects of computers and computer games on the children's intellectual development and development of necessary skills. In addition, their hesitation to decide whether computer use provides more quality time for their children than watching TV can be linked to the results of the recent study about the trends of using DT among children in the elementary school (Fraillon, Ainley, Schulz, Friedman and Gebhardt, 2014). The study shows that children use DT for primarily recreational purposes, erasing the differences in quality regarding time spent in front of computer and TV.

Parents' attitudes regarding the advantages and disadvantages of computers for their children were measured on a 5-point Likert scale, where 1 = strongly disagree and 5 = strongly agree. Four statements were inversely coded (statements 2, 4, 7, and 8), in order for the high agreement with specific statements to unambiguously point to the positive attitude of parents toward their children's computer use.

Generally, it can be stated that parents have a moderately positive attitude toward their children's computer use. The positive attitudes of parents are indicated by their high level of agreement with the following statements: *Children learn new and useful things on computer* (M = 3.72, SD = 0.99), *When using computers, children gain valuable IT skills which will be useful for them in the future* (M = 3. 98, SD = 0.91), and *Computers can have only negative influence on children's development** (M = 3.91, SD = 1.03). The last statement is inversely coded, indicating that parents deny exclusively negative impacts of computer on children's development, referring to the positive effects of children's computer use.

The negative attitudes of parents are indicated by their high level of agreement with the following statements: *Children who regularly use computer are at risk of developing dependence* (M = 2.26, 1.08), *Children engage in sport less frequently due to the increased computer usage* (M = 2.37, SD = 1.31) and *Excessive use of computers may separate children from their parents and friends* (M = 2.47, SD = 1.23). All three statements are inversely coded and parents expressed a high level of agreement with their original form, which largely overlaps with media messages related to children's computer use.

Parents' attitudes towards use of computers by young children were measured on a 5-point Likert scale, where 1 = strongly disagree and 5 = strongly agree. Table 10 shows the number of parents who provided responses for a particular item and demonstrates the linear increase in the positive attitudes of parents with increasing age of the child.

The attitude of parents toward the use of computers by children aged two or younger is generally negative (M = 1.91, SD = 1.13), while their attitude toward the use of computers by 6 years old children is mostly positive (M = 4.00, SD = 0.99).

Surprisingly, no statistically significant correlation was found between the highest completed degree of education of parents and their attitudes towards the advantages and disadvantages of children's computer use nor between the parents' education and children's computer activities at home.

The survey of parents with children enrolled in a large public kindergarten in the capital of Croatia aimed to determine the number of households that possess personal computer or smartphone or tablet and to determine the frequency with which the child uses the PC or smartphone or tablet.

Also, we tried to determine if children have access to a computer outside their home and to examine children's computer use for different purposes (learning, play, communication with others, as well as the passive use of computers – listening to music and watching cartoons). Parents also expressed the amount of time their child spends on the computer in a single week in hours. Data were collected on 152 parents, but only 111 of them provided the answer to this question. The average number of hours the child spends on the computer was 3 hours and 4 minutes (M = 3.07, SD = 3.35) where the maximum amount of time spent on the computer was 15 hours per week , and the lowest was less than 1 hour per week.

Table 10

Mean and Standard Deviation Scores of Parents' Attitudes Towards Use of Computers by Young Children

	N	Min	Max	M	SD
Children aged 2 years and younger	136	1	5	1,91	1,13
Children aged 3 years	136	1	5	2,59	1,16
Children aged 4 years	135	1	5	3,27	1,08
Children aged 5 years	141	1	5	3,72	0,97
Children aged 6 years	143	1	5	4,00	0,99

In determining the frequency of child's computer use, 152 parents that were surveyed had to choose one of the six provided answers (Table 11).

The results showed that 40.76% of children used computers on a weekly basis, while the number of children who use them occasionally (22%) was close to the number of children who use the computer on a monthly basis (20%). Only 1% of children used computer on a daily basis. It points to the fact that parents do not prohibit computer use, but rather control the child's use of computers at home.

When asked about their child's computer activities, parents had to choose one or more of the listed activities (Table 12). The largest number of parents answered that their children watch cartoons (70.5%), play games (60.9%) and listen to music (44.2%). Furthermore, 24.8% of parents stated that their children use educational software (e.g. *Sunčica, Mala učilica*), while a relatively small number of parents said they children draw on the computer (17.8%) or communicate via applications like Skype (17.2%). A very small number of parents stated that their children use internet (8.5%) or that they use computer to store and organize data (5.4%), since these actions represent more demanding skills for a child. Parents who chose *something else* as their answer, cited the use of MS Word (1.6% of parents).

Table 11

Frequency of child's computer use

	N	%
Daily	1	0,64
Weekly	64	40,76
Monthly	27	17,20
Less than once a month	2	1,27
Occasionally	30	19,11
Never	11	7,01

Table 12

Children's computer activities

Activity	N	%
Watch cartoons	91	70,5
Play games	78	60,9
Listen to music	57	44,2
Use educational software (e.g. *Sunčica, Mala učilica*)	32	24,8
Draw	23	17,8
Communicate via applications like Skype	22	17,2
Use internet	11	8,5
Store and organize data (e.g. photos, music)	7	5,4
Something else (e.g. using MS Word)	2	1,6

5. Discussion

This study primarily aimed to investigate parents' perception and attitudes toward DT use in early childhood and towards DT education in kindergartens as well as their beliefs about how their kindergarteners use computers at home.

Despite its contributions to early childhood education, the study is not free from limitations. The small sample size does not allow broad generalizations from the available data and, although taken from one of the largest kindergartens in the capital of Croatia, our sample may not be representative of parents in the whole country.

Yet, our research results suggest that parents of kindergarteners support introduction of digital literacy education as part of the educational program in kindergarten and express their desire to participate in educative workshops that would instruct them on the positive and negative impacts of DT in early childhood. Our findings are in line with results of some of the latest studies (Hatzigianni and Margetts, 2014), suggesting that parents have positive attitudes toward DT use in early childhood. Parents generally believe that DT improves and increases their children's technological awareness and has positive impact on their educational development.

A common fear and objective concern that parents face is how DT affects their children's social lives and their health, especially since they become more prone to obesity as their active activities decline, which is again in line with results of some previous studies on parents' concerns about young children's computer use (Hatch, 2011, Hatzigianni and Margetts, 2014).

Regarding child's computer activities, as presented in the previous chapter, the trend of using DT for primarily recreational purposes (playing games and listening to music) starts as early as kindergarten. Unfortunately, the recent study (Fraillon, Ainley, Schulz, Friedman and Gebhardt, 2014) shows that this trend in Croatia continues through elementary school, contributing to the lack of children's digital literacy skills and ultimately to a high rate of illiterates.

The International Computer and Information Literacy Study – ICILS 2013 (Fraillon *et al.*, 2014) conducted by the International Association for the Evaluation of Educational Achievement revealed that Croatian students in Grade 8 (14 years of age) are very well equipped with DT hardware (since 98% has at least one computer at home), but lack important computer and information literacy skills. Study has covered 2913 students from 179 Croatia primary schools.

Only 9% of students in Croatia reported using educational software designed to help with school study (e.g., mathematics) at least once a week. Also, proportion of Croatian students reporting usage of "drawing, painting, or graphics software" at least once a week outside of school was only 13%.

On the other hand, "listening to music" stood out as a very common weekly activity of Croatian students (90% of students in Croatia reported "listening to music" as a weekly activity). Also, the number of students in Croatia using computers to "play games" on a weekly basis was significantly higher than the ICILS 2013 average (63%).

We can conclude that children's computer activities in Croatia do not change much from the kindergarten age to adolescent age, and are mostly limited to using computer

technology for recreational purposes, which is rather alarming than encouraging. The possible reason for such problem is that DT education in Croatia does not have obligatory status at any level.

As to the lifespan of these findings, we believe that no significant change in child's computer activities and digital illiteracy will take place until and unless DT education gets introduced in kindergartens in the form of systematic instruction and until DT education becomes an obligatory primary and secondary school subject in Croatia.

To improve the validity of these findings, more extensive study in both rural areas and big cities should be conducted to determine parents' and educators' expectations and concerns regarding early childhood digital technology education. Information on these expectations may help those involved in the design of the early childhood curriculum (such as ministries and agencies for early, preschool, primary and secondary education) to identify major strengths and weakness of introduction of DT education in institutions of early childhood education as well as implications for parents of kindergarteners.

Finally, we believe that age-appropriate digital literacy education, that starts in early childhood and involves both parents and kindergarten educators, can change the above listed statistics and motivate children to acquire more complex DT skills needed for the occupations of the future.

6. Conclusion

Digital technology tools are effective only when used appropriately. Passive use of technology is not an adequate substitute for active play, engagement with other children and children interaction with adults.

When used purposefully in early childhood, DT tools can encourage effective learning and child's development, supporting the pre-established age-appropriate learning objectives. Parents, guardians, educators in early childhood and other responsible adult members of society have a responsibility to provide children a safe environment for play and learning with new technologies, in the same way they are responsible to provide children with a safe childhood in the non-digital world.

Siraj-Blatchford and Whitebread (2003) point out that, when children enter the kindergarten or school, they bring different DT experiences that are in some way related to the ability of their parents to use the technology. Therefore, it is important to involve parents in the acquisition of DT skills and digital literacy of their children from their early childhood years.

Since the lives of children, their parents, their families and educators are shaped by technology, early childhood education institutions can benefit from the expansion of learning opportunities through DT. Technology should be used to support existing developmental and educational goals instead of replacing them or distort them. For example, drawing on the touch screen can enrich the child's experience and understanding of graphic display, as well as manipulation of colors and shapes, allowing the child to explore colors and shapes. This possibility should not replace crayons, mark-

ers, pastels and other graphic art materials, but rather provide the additional mode of self-expression.

Currently, in majority of the public kindergartens in Croatia parents are being motivated to collaborate and communicate with the kindergarten through the web site which visualizes kindergarten's educational content, brings photos of children's activities and their stories. Also, in kindergarten where our survey was conducted, educators strive to explain the parents in their regular meetings the policy of DT integration, emphasizing key learning objectives, forms and DT activities they use, employing DT to show the results of projects and activities with children. Both the web site and meetings with parents had excellent attendance so far.

The plan for the future is to organize special workshops for parents in kindergartens to present the activities involving DT as well as "rules of action" regarding DT use that parents should follow at home. Also, educators in kindergartens should start collecting electronic portfolios of children's works, distribute them to parents at the end of the year and organize the presentation of children's works created with the help of DT.

Finally, in order for children to become true DT literates, educators in kindergartens and schools should take advantage of all children's experiences with DT at home, while parents should strive to accept policies and approaches to using DT at home the way it is planned to be used in early childhood educational institutions.

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