Preschool Teachers' Views on the Use of Digital Technologies in Working with Preschool Children

Biljana Novković Cvetković, Ana Spasić Stošić, Ivana Tasić Mitić
and Aleksandar Stojadinović
University of Niš, Pedagogical Faculty in Vranje

Abstract

Digital technologies have been used in the classroom at all levels of education for many years. Their use came to the fore especially during the COVID-19 pandemic. As an integral part of the system of institutional education, preschool education is a field in which their use is also necessary in order to ensure a complete process of care, upbringing, education and an integrated approach to learning. In this regard, the goal of the present research was to determine the views of preschool teachers on the use of digital technologies in the classroom, with a special focus on the content of speech development, environmental education and music education. Despite the necessity of their use, the results of the research indicate that preschool teachers apply digital technologies to an insufficient extent when working with children of preschool age. According to the respondents' opinions regarding the field of speech development, prose literary texts and language games are the most suitable to be used with these technologies. When it comes to environmental education, the use of digital technologies gives the best results when learning about animals and plants. When teaching music education, listening to music and children's music games are the most suitable activities to be taught using digital technologies.

Key words: *digital technologies; environmental education; music education; preschool education; speech development.*

Introduction

The traditional learning system in educational institutions, starting with early and preschool education, was disrupted by the COVID-19 pandemic, which asked for the application of new learning models. The epidemic required social distancing from all participants in the education process, which meant adapting to online learning, using

digital technology and switching to distance learning. The education of children around the world required a new and unexpected form of learning that broke the boundaries of space and time. As a consequence, preschools, schools and universities tried to educate children from home in a digital environment through personal computers, tablets and mobile phones. "The situation with the pandemic has provided an opportunity for many countries (especially the countries of the Western Balkans) to make their education systems more effective, inclusive and resilient, and to support the reduction of the digital gap and the improvement of the digital skills of teachers along with the introduction of online instruction" (World Bank Group, 2020, 3, p.1).

Before the outbreak of the pandemic, digital technologies were insufficiently and unsystematically used in preschool institutions. The reason for this can be found in the process of initial education of preschool teachers, in which new technologies were insufficiently represented, as well as the existing professional development programs that were almost non-ereexistent in this field (Stanisavljević Petrović & Pavlović, 2017). Preschool teachers did not have enough opportunities to develop digital skills. The principal reason for this was the lack of equipment in preschool institutions. On the other hand, insufficient training of teachers in preschools and parents in the use of digital technologies was a major stumbling block (Yildiz, Kilic, Acar, 2022). Limited application of online learning came, first of all, from the limited experience or skills of preschool teachers in using digital technologies. Professional development programs for preschool teachers needed to focus more on developing technology-related teaching skills (Kim, 2020).

Studies on digital learning during the COVID-19 pandemic have shown that teachers in preschools, as well as all participants in the education process, were taken aback by the pandemic and the requirements imposed on the education process by the pandemic. With the closure of schools, preschool teachers, teachers, students and parents faced various difficulties, and many countries continued their educational activities in an online environment using digital technologies (Spiteri, 2021; Van Lancker & Parolin, 2020; Jandrić, 2020; OECD, 2020; Zhang et al., 2020).

Given that preschools generally faced obstacles to integrating technology into their learning process due to insufficient technological resources, support, personal experience and digital skills (Hu & Yelland, 2017), this sudden transition required a rethinking of roles and teacher skills, which could pave the way for teacher education programs to design appropriate approaches and practices for online teaching and learning in early childhood education (Kim, 2020).

Regardless of its necessary application during the pandemic, it is considered that digital technology has enormous advantages in modernizing education in preschool and encouraging the interaction among all the participants in the education process. There are beliefs that the use of digital technology in preschool education can promote the development of both teachers and children. Although certain risks and limitations have been pointed out (McPake et al. 2013; Plowman et al. 2011), more

and more preschool children have access to the Internet and use digital tools. Digital technologies at this level of education provide opportunities to design and perform numerous communicative and creative activities (Kim, 2020). In preschool education, they include a wide range of digital tools such as educational software for preschool children, computers (desktop, laptop), mobile devices (tablet, phones), interactive whiteboards, electronic toys, cameras, projectors, etc. It is considered that new technologies, if they are adequately integrated into education, can be multifunctional (Arsenijević & Andevski, 2011). In this regard, online learning requires an integrated approach that includes access to digital content, digital competences of teachers and appropriate equipment. The methods used must be adapted to the physical separation of preschool teachers and children of that age. Only if the technologies are adapted to the child's age can the digital content be properly adopted. At preschool age, adults play a key role in the process of online learning, because children at that age do not have the potential to be independent in this type of learning. Adult support consists in organizing appropriate activities with certain resources. For these reasons, the attention of preschool teachers should be focused on creating safe conditions for online learning in order to develop children's abilities to think, understand and use the digital technologies necessary for life in modern society (Edwards et al. 2018; Manches and Plowman 2017; McPake et al. 2013).

Previous research

There is a small number of studies on the application of digital technologies in preschools. A few of them, relevant to the topic, are discussed in this paper. Research conducted on a representative sample of 1560 preschool teachers, professional associates and principals in 25 institutions in the territory of the Republic of Serbia (Belenzada et al., 2020) showed that preschool teachers do not often use digital technologies in their direct work with children. A small number of them use these technologies to interact with children during play, as well as to document their own practice, and an extremely small number of them use it for the purpose of learning and supporting the development of early literacy. Participants recognize the importance of using digital technology to directly communicate with parents, which can be explained by the fact that it was the only form of communication during the pandemic. Such results regarding the application of digital technology indicate that teachers are insufficiently trained to use it, as well as the lack of digital equipment in preschools. Examining the attitudes of the participants from the same sample about the need to improve their own digital competences, it was determined that, although only 40 % of practitioners have received professional training in this field, the largest number (90 %) showed willingness for additional training and were willing to use digital technologies in working with preschool children (Šaponjić et al., 2020).

A survey conducted on a sample of 101 teachers working in preschools in the third district of Athens showed that, among the many available digital tools, the participants

prefer the e-classroom, evaluating it as very useful. This can be explained by the fact that it can be easily used by preschool teachers and children, no additional training is required to use it, and it can be easily upgraded and adapted to the requirements of all education fields (Fotti, 2020).

In relation to the availability and use of computers in preschool institutions in Chile, it was found that at that education level, children use digital technology to a greater extent compared to students in primary and secondary schools, despite the fact that kindergartens are not sufficiently equipped, and preschool teachers have insufficient digital competences. Although similar obstacles and challenges to using computers at other education levels are mentioned as well, education in preschools is focused on reaching the objectives that contribute to the development of competences and skills necessary for life in modern society. The use of computers at preschool age has a specific and concrete role that ensures better results and outcomes in all aspects of education. This suggests that the application of computers, education software and other technologies is important for the improvement of certain subjects, and should be taken into account when creating educational policies for this age group (Hinostroza et al., 2013).

A study conducted in France showed that the acceptance of digital technologies depends on preschool teachers' beliefs about the importance of using educational applications in preschool education. Within a two-stage study, the beliefs of 214 teachers about digital technology were first assessed, followed by an examination conducted on a sub-sample of 62 participants, testing the acceptance of educational tablet application in direct work with children. The obtained results point to the conclusion that the social status of the preschool institution is a key factor on which the beliefs and level of acceptance of digital technology by preschool teachers depend. Preschool teachers who work with children with educational and social difficulties believe that the application of digital technology is less effective in working with them, which also influenced their lower acceptance of the aforementioned application compared to other participants (Horeau et al., 2021).

Since the use of digital technology came to the fore during the COVID-19 pandemic, a large number of studies on their application were conducted precisely in that period. Thus, a survey was conducted in Turkey on a sample of 24 preschool teachers with the aim of identifying their needs and possibilities regarding the way of organizing and implementing distance education. The most important findings of the study conducted through interviews have shown that participants do not have sufficiently developed digital skills and that there is a need to increase both the number of interactive resources, and educational platforms adapted for work with preschool children (Alan, 2021). A similar study in Turkey, conducted on a sample of 25 preschool teachers and 30 parents, examined the consequences of the pandemic on preschool education, where the main questions were focused on the way of its implementation, organizing activities, challenges and measures that should be taken to teach under such circumstances. Participants stated that the COVID-19 pandemic had numerous

negative effects on preschool education. By working together on preschool teaching of the fields of Turkish language, mathematics, science, visual arts and music, teachers and parents tried to help children develop communication, cooperation, critical thinking and problem-solving skills. During that process, they faced numerous challenges, and they emphasized the importance of taking measures, such as providing educational web content that would help preschool children develop cognitive, affective and psychomotor skills (Yildirim, 2021).

There are optimistic beliefs that children who are provided access to digital technology in preschool will attain better academic and career achievements (U.S. Department of Education – Office of Educational Technology, 2017). With this knowledge in mind, Hurwitz and Schmitt (2020) investigated whether preschool children's digital skills and Internet use ensure better achievements in the future education process. The data were collected from a survey among 101 American parents about their children aged between 5 and 11, that is, about their digital skills, Internet use, and school performance. Digital skills acquired in early childhood have been found to significantly influence their children's development during later education, which is positively related to school performance. In order to enable children to use digital technology in a productive way, it is necessary to provide support to preschool teachers and parents to help them develop digital skills properly. In order for future preschool teachers to be trained in the use of digital technologies, it is necessary that they have appropriate training in the process of initial education at higher education institutions. Addressing this issue, a descriptive study by Kim (2020) found that instruction needed to be modified to enable students, future preschool teachers to build skills to deliver online classes in the spring semester of 2020 in the US. Describing the three phases they went through during the course – preparation, implementation and reflection – the students were given the opportunity to interact with children, which provided a foundation for further thinking about promoting preschool children's learning how to use digital tools. This study leads to the conclusion that the development of digital competences of preschool teachers should be supported by appropriate teaching strategies at faculties, as well as by online cooperation with preschools and families.

A study conducted in China during the COVID-19 pandemic (Hong, Zhang, Liu, 2021) showed that preschool teachers had difficulties in applying digital technology, due to lack of experience. The perceived benefit of the applied technology and the ease of its use were two key features that played a central role in the process of further adoption of technologies, as shown in this research, as well as in previous research conducted before the pandemic (Marangunić & Granić, 2015; Cigdem & Ozturk, 2016; Rafique et al., 2018; Chen & Aklikokou, 2019).

Insufficient training of preschool teachers in the use of digital technologies and insufficient technical equipment of preschool institutions are a major stumbling block to the application of digital technologies in preschools (Celizić & Zovko, 2021, Yildiz, Kilic, Acar, 2022).

Methodology

As preschool teachers are expected to use digital technology in the process of preschool education, this research aimed at determining the current state of affairs regarding the application of those technologies in the process of education of preschool children. The goal of the research was primarily focused on the use of digital technology in direct interaction with preschool children. The research objectives related both to the examination of preschool teachers' opinions about the use of digital technology in direct work with children aged six, before starting school, as well as to the specific digital tools they most often use and their ability to apply digital technology. One of the basic objectives covered the areas of speech development methodology, environmental and music education. Bearing in mind the character of the research, the main methods applied were descriptive scientific research (survey) in its emphasized analytical variant, and theoretical analysis. The gathering method used was a survey, while a questionnaire with 20 closed-ended questions was the main instrument created for the purposes of the paper. The first part of the questionnaire contained questions about the general characteristics of the participants, whereas in the second part, the questions were designed according to the principle of single choice and multiple choice questions. In the paper, the obtained results were interpreted based on 9 questions relevant to the topic discussed. Statistical data analysis was performed using frequencies and percentages. The likelihood ratio test was used to examine the relationship between two categorical variables, given the small number of respondents per category. Binary logistic regression was used to examine the predictive properties of the independent variable. Data analysis was performed using the statistical program SPSS ver. 25. The Cronbach's-alpha coefficient, which was greater than 0.700, determined the reliability of the questionnaire. The research was conducted at the beginning of February 2022 on a sample of 318 preschool teachers employed in the preschool institution *Naše dete* in Vranje.

Results

A total of 318 respondents with different years of service took part in the research. The largest number of respondents, 122 of them, had 21 to 30 years of service, 94 had between 11 and 20 years of service, 81 respondents had between 31 and 40 years of service, and the smallest number, 21 preschool teachers, had up to 10 years of work experience.

Based on the data obtained, shown in Table 1, the answer to the first question, whether they use digital technologies in teaching children of preschool age, the largest number of participants, 44.6 % of them, occasionally use digital technology in working with children of preschool age. A slightly smaller percentage, 38.4 %, often use them, and only 16.9 % of teachers do not use those technologies at all when working with children. There is a statistically significant difference ($p<0.001$) among the respondents in their answers according to their seniority at work. Namely, preschool teachers with fewer

years of service use digital technologies to a significantly greater extent than preschool teachers with more years of work experience, which is understandable, because they are younger teachers who are more open to the use of innovations. Preschool teachers with more years of work experience are used to the traditional work system and show resistance to the introduction of innovations in the education process, especially to the application of technologies.

Since there is a wide range of digital tools intended to be used in the education process, participants were offered a list of three that the authors assumed were most often used – Viber, some of the e-learning platforms (Google Classroom, Zoom, Moodle...), email. The fourth option offered the possibility for participants to name another digital tool that they use most. Given that none of the preschool teachers used that option, only the previously offered options were considered. The results shown in Table 1 point to the conclusion that the Viber application is the most popular digital tool within the research sample, a digital tool used by educators in cooperation with parents and children. As many as 73.9 % of the participants opted for this application. A significantly smaller percentage of preschool teachers, 21.2 %, prefer email, and an extremely small number, 4.9 % of them, prefer one of the e-learning platforms. We tested the difference between respondents with different levels of seniority at work in their preference for using digital tools in the education process. The findings show that there is a statistically significant difference between the responses of the participants according to their work experience (p=0.001). Preschool teachers with more than 20 years of service use Viber more often than those with fewer years of work experience.

Viber is the application found on mobile phones and the easiest one to use, and was, therefore, the most popular one. The COVID-19 pandemic directly promoted the development of mobile learning (Ralph & Petrina, 2019) and the possibility for children to learn online with their phones. Whether it be preschool classes or work meetings, they can be carried out online, via mobile phones (Power, 2019). Mobile online learning can play a significant role in multimedia teaching, allowing pre-schoolers to stay focused in class. Expanding the coverage of wireless networks, increasing the response speeds of network resources and the amount of digital learning resources will also affect the effectiveness of online learning for students (Zhou, 2022).

In order to ensure the correct use of digital technologies in the process of preschool education, it is necessary for teachers to be trained how to use them. The self-assessment of almost half of the respondents (45.0 %) is that they are fully trained to use those tools. A total of 38.0 % of them believe that they are partially trained, while 17.0 % of the respondents estimate that they are not trained to use digital technologies for work with preschool children. As expected, there are differences with regard to the teachers' years of service (p<0.001).

Participants with more experience in work with children believe to a significantly greater extent that they are partially qualified or not qualified/trained to use digital technologies than the category of preschool teachers with shorter work experience (Table 1).

Table 1

The use of digital technologies when working with children

	Years of service				
	[ALL]	0 - 10	11 - 20	21 - 30	31 - 40
	N=318	N=21	N=94	N=122	N=81
Frequency of using digital technologies in teaching children of preschool age:					
Yes, often	122 (38,4 %)	15 (71,4 %)	72 (76,6 %)	27 (22,1 %)	8 (9,9 %)
Occasionally	142 (44,6 %)	5 (23,8 %)	18 (19,2 %)	76 (62,3 %)	43 (53,1 %)
I do not use them	54 (16,9 %)	1 (4,8 %)	4 (4,2 %)	19 (15,6 %)	30 (37,0 %)
p value	<0,001				
Digital tools that are most often used in direct work with preschool children:					
Viber	196 (73,9 %)	13(62,0 %)	56 (62,2 %)	81 (78,6 %)	46 (90,2 %)
Some of the e-learning platforms (Google Classroom, Zoom, Moodle...)	13 (4,9 %)	3 (14,2 %)	8 (8,9 %)	1 (1,0 %)	1 (2,0 %)
Email	56 (21,2 %)	5 (23,8 %)	26 (28,9 %)	21 (20,4 %)	4 (7,8 %)
p value	0,001				
Qualification of preschool teachers for using digital technologies:					
Yes, completely	143 (45,0 %)	16 (76,2 %)	68 (72,4 %)	42 (34,4 %)	17 (21,0 %)
Partially	121 (38,0 %)	4 (19,0 %)	22 (23,4 %)	61 (50,0 %)	34 (42,0 %)
I am not qualified	54 (17,0 %)	1 (4,8 %)	4 (4,2 %)	19 (15,6 %)	30 (37,0 %)
p value	<0,001				

Note. Likelihood ratio test was performed.

In the conducted research, special emphasis was given to teaching with the use of digital technologies in the fields of speech development, environmental education and music education. Within the framework of speech development, the participants had the opportunity to choose the areas in which the use of digital technologies yields the best results. The following areas were offered: language games, lyrical poems, prose literary texts, preparation for initial reading and writing. The percentage of the obtained results can be seen in Table 2. It can be seen that preschool teachers estimated that the areas of preparation for initial writing (3.3 %) and reading (6.0 %) were the least suitable for the application of digital technologies, and that the lyrical poems area was ranked somewhat better (17.5 %). Participants are of the opinion that digital technologies are very suitable for prose literary texts (30.1 %), while the application of those technologies gives the best results in teaching language games (40 %). The

likelihood ratio test shows that there is no statistically significant difference (p>0.05) between the respondents' answers depending on their years of service.

When it comes to learning about the environment, there was the possibility of choosing the following learning content: learning about animals and plants, learning about man as a natural and social being, learning about pollution, learning about natural phenomena and material properties, geographical content and traffic-related content.

Table 2

The use of digital technologies in the fields of speech development, environmental and music education

	Years of service				
	[ALL]	0 - 10	11 - 20	21 - 30	31 - 40
	N=318	N=21	N=94	N=122	N=81
Types which give the best results when using digital technologies in the field of speech development:					
Language games	226 (40 %)	17 (80,9 %)	72 (76,5 %)	101 (82,7 %)	36 (44,4 %)
Teaching lyrical songs	99 (17,5 %)	6 (28,5 %)	21 (22,3 %)	47 (38,5 %)	25 (30,8 %)
Teaching prose literary texts	187 (33,1 %)	11 (52,3 %)	57 (60,6 %)	79 (64,7 %)	40 (49,3 %)
Preparation for initial reading	34 (6,0 %)	3 (14,2 %)	11 (11,7 %)	18 (14,7 %)	2 (2,4 %)
Preparation for initial writing	19 (3,3 %)	1 (4,7 %)	8 (8,5 %)	9 (7,3 %)	1 (1,2 %)
p value	0,276				
Types which give the best results when using digital technologies in the field of environmental education:					
Content about animals and plants	173 (47,0 %)	14 (66,6 %)	63 (67,0 %)	71 (58,2 %)	25 (30,9 %)
Content about man as a natural and social being	31 (8,4 %)	6 (28,5 %)	8 (8,5 %)	9 (7,4 %)	8 (9,9 %)
Content about pollution	21 (5,7 %)	3 (14,2 %)	5 (5,3 %)	7 (5,7 %)	6 (7,4 %)
Content about natural phenomena and properties of materials	46 (12,5 %)	7 (33,3 %)	14 (14,9 %)	12 (9,8 %)	13 (16,0 %)
Geographical content	34 (9,2 %)	5 (23,8 %)	10 (10,6 %)	10 (8,2 %)	9 (11,1 %)
Traffic-related content	63 (17,1 %)	10 (47,6 %)	16 (17,0 %)	18 (14,8 %)	19 (23,5 %)
p value	0,160				

	Years of service				
	[ALL]	0 - 10	11 - 20	21 - 30	31 - 40
	N=318	N=21	N=94	N=122	N=81
Types which give the best results when using digital technologies in the field of music education:					
Counting rhymes	127 (13,5 %)	9 (42,9 %)	31 (33,0 %)	62 (50,8 %)	25 (30,9 %)
Singing songs	175 (18,7 %)	14 (66,7 %)	47 (50,0 %)	78 (63,9 %)	36 (44,4 %)
Children's music games	210 (22,4 %)	18 (85,7 %)	63 (67,0 %)	101 (82,8 %)	28 (34,6 %)
Playing instruments	59 (6,3 %)	6 (28,6 %)	17 (18,1 %)	29 (23,8 %)	7 (8,6 %)
Listening to music	248 (26,5 %)	20 (95,2 %)	78 (83,0 %)	106 (86,9 %)	44 (54,3 %)
Free musical expression and creation	116 (12,4 %)	11 (52,4 %)	36 (38,3 %)	43 (35,2 %)	26 (32,1 %)
p value	0,709				

Note. ≠Multiple question. Likelihood ratio test was performed.

The largest percentage of participants chose learning about animals and plants (47.0 %) as the most suitable to be taught with the help of digital technologies. A significantly smaller percentage chose traffic-related content (17.1 %) and learning about natural phenomena and material properties (12.5 %), and almost the same percentage chose geography-related content (9.2 %) and learning about man as a natural and social being (8.4 %). By far the smallest number of preschool teachers estimated that learning about pollution (5,7 %) is suitable to be taught with the help of digital technologies. There is no statistically significant difference ($p > 0.05$) in the distribution of answers to this question depending on the teachers' years of work experience.

Based on an overview of the field of music education in which the expected results are achieved by using digital technologies, the participants gave the greatest preference to listening to music (26.5 %), to children's musical games (22.4 %) and singing songs (18.7 %). Less suitable areas for the application of new technologies are counting rhymes (13.5 %) and free musical expression and creation (12.4 %), while playing children's musical instruments is considered the least suitable area for their use (6.3 %). As in the field of speech development and environmental education, the music education field also showed no statistically significant correlation in the responses of the participants with different years of service ($p > 0.05$).

The use of digital technologies in working with children of preschool age in relation to the variable of professional advancement in this field

It is assumed that preschool teachers who have had professional training in the use of digital technologies apply the acquired knowledge in their immediate practice. This

is the reason why we examined a subsample of those respondents about their habits in using digital technologies. The obtained results are shown in Table 3. Half of them (52.7 %) use digital technologies very often when working with children, 35.1 % do it occasionally, while 12.2 % of preschool teachers do not use these technologies. Looking at their years of service, the category of participants with 11 to 20 years of service, who mostly received professional training for the application of new technologies, often use them when working with preschool children. On the other hand, the oldest category by years of service apply digital technologies to the smallest extent in the process of preschool education. There is an extremely small number of participants in each category of years of service who do not use these technologies. This difference is statistically significant, p=0,002.

Table 3

The use of digital technologies by respondents who have undergone education for the use of digital technologies in working with children

		Years of service			
	[ALL]	0 - 10	11 - 20	21 - 30	31 - 40
	N=74	N=9	N=32	N=27	N=6
Usage of digital technologies in teaching children of preschool age:					
Yes, often	39 (52,7 %)	6 (66,7 %)	23 (71,9 %)	8 (29,6 %)	2 (33,3 %)
Occasionally	26 (35,1 %)	2 (22,2 %)	8 (25,0 %)	15 (55,5 %)	1 (16,7 %)
I do not use them	9 (12,2 %)	1 (11,1 %)	1 (3,1 %)	4 (14,9 %)	3 (50 %)
p value	0,002				
Digital tools that are most frequently used in direct work with preschool children:					
Viber	54 (73,0 %)	5 (55,6 %)	23 (71,9 %)	22 (81,5 %)	4 (66,6 %)
Some of the e-learning platforms (Google Classroom, Zoom, Moodle...)	5 (6,8 %)	1 (11,1 %)	2 (6,2 %)	1 (3,7 %)	1 (16,7 %)
Email	15 (20,2 %)	3 (33,3 %)	7 (21,9 %)	4 (14,8 %)	1 (16,7 %)
p value	0,754				
Level of preschool teachers' training for using digital technologies:					
Yes, completely	28 (37,8 %)	7 (77,8 %)	14 (43,7 %)	6 (22,2 %)	1 (16,8 %)
Partially	37 (50,0)	1 (11,1 %)	15 (46,9 %)	18 (66,7 %)	3 (50 %)
I am not qualified	9 (12,2 %)	1 (11,1 %)	3 (9,4 %)	3 (11,1 %)	2 (33,2 %)
p value	0,039				

Note. Likelihood ratio test was performed.

When asked what digital tools they use most often in their work, respondents who have received professional training in this field most often use Viber (73.0 %), followed by e-mail (20.2 %), while only 6.8 % of them use one of the e-learning platforms. The frequency of using certain tools is not statistically significantly related to the length of the teacher's work experience (p=0.754).

The following question assessed whether the training for the use of digital technologies affected the teacher's ability to use them. The most numerous group of participants

who were trained in the use of digital technologies, that is, the categories with longer work experience (11 to 20 and 21 to 30), estimated that they were partially qualified to use digital technologies when teaching preschool children. The data show that a large number of preschool teachers with up to 10, and between 11 and 20 years of service believe that they are fully qualified to use digital technologies, while there is an extremely small number of participants from all categories who are not qualified. This difference is also statistically significant (p=0,039).

Table 4 shows data related to the question of whether length of service is a statistically significant predictor of the use of digital technologies in working with children. Binary logistic regression shows that years of service are a statistically significant predictor of the use of digital technologies (Exp(B)= 0.928, 95 % CI: 0.871- 0.988, p=0.020). The value of Exp(B) indicates that with the increase in the years of service, the chance of using digital technologies in the process of preschool education decreases.

Table 4

Prediction of the use of digital technologies depending on the years of service

	Wald	p	Exp(B)	95 % C.I.for EXP(B)	
				Lower	Upper
Years of service	5,451	0,020	0,928	0,871	0,988

Note. Dependent variable: using digital technologies in teaching children of preschool age (often+ occasionally=1, I do not use them=0). Cox & Snell R Square=0,113. Binary logistic regression was performed.

Discussion

Bearing in mind that modern technologies are an indispensable part of the educational system in almost all developed countries (Drigas et al., 2015, Kuzmanović et al., 2016, González & Martin, 2018), this paper dealt with their application in the process of preschool education. The conducted research points to the fact that preschool teachers occasionally apply digital technologies when teaching children of preschool age. Similar results were obtained in the research by associates from the Institute for Pedagogical Research in Belgrade (Belenzada et al., 2020). Preschool teachers with shorter work experience apply digital technologies in their work much more often than their older colleagues, which can be explained by the fact that during their education at higher education institutions they were trained in their use in certain courses. The fact that the smallest portion of the total number of participants do not use new technologies in direct work with children is encouraging. Numerous types of modern technology are available to preschool teachers for the preparation and implementation of the teaching process. Unlike their colleagues in Greece, who prefer the e-classroom (Fotti, 2020), the largest number of participants included in the sample of the present research prefer the Viber application, presumably because it is easily used. The fact that preschool teachers with more than 20 years of service use Viber more often than those with fewer years of work experience, as this research shows, can be explained by its presence in everyday communication.

Among the various aspects of preschool education, the central topic of this research is the realization of the learning content related to speech development, environmental and music education. Regarding the field of speech development, the results have shown that all categories of preschool teachers believe that language games and teaching prose literary texts give the best results when taught with digital technologies. When it comes to environmental education, the largest number of participants, regardless of their years of service, believe that learning content about animals and plants is the most suitable to be taught by using digital technologies. As for music education, preschool teachers give priority to listening to music, children's musical games and singing songs, compared to other aspects of music education, where the use of new technologies can give more effective results. The ability of teachers to apply modern technologies is essential for their successful implementation. Studies conducted worldwide show that digital competences of teachers are insufficiently developed (Alan, 2021; Hinostroza et al., 2013). Similar results have been obtained within this research, where the largest number of teachers with longer work experience estimate that they are partially qualified to use digital technologies in direct work with pre-schoolers. Nevertheless, the fact that the category of participants with less work experience believe that they have developed digital competences is encouraging.

Since digital competences are developed and improved through professional training, it is surprising that only a quarter of the sample attended professional seminars in this field. It is expected that preschool teachers who have received professional training and belong to the category with fewer years of service, often use digital technologies in their teaching practice. Likewise, the most experienced preschool teachers (with longest seniority) least frequently apply digital technologies in the process of preschool education, which can be explained by the fact that during formal education they did not have the opportunity to acquire knowledge about digital technologies. Therefore, it has been confirmed that length of service is an important predictor of their use. The Viber application is the most popular digital tool among all categories of teachers who have been trained in this field. When it comes to their ability to use new technologies, the research has shown that teachers with shorter work experience who received professional training to use digital technologies assess to a significantly greater extent that they are fully qualified to apply digital technologies, compared to those with longer work experience.

Conclusion

As digital technologies affect the education process at all levels (Kuzmanović et al., 2019), their effect is inevitably present in preschool education. It is the first level within the system of institutional education, which, among numerous lifelong competences, provides the foundation for the development of children's digital competences. There are numerous reasons that point to the importance of applying digital technologies in working with children of preschool age. First of all, they create a stimulating

environment for the development and learning of preschool children. Preschool teachers are provided with numerous opportunities for the implementation of education, and considering the new life circumstances, there is strong support from the social system for the integration and implementation of digital technologies in all segments of the education process (Bolstad, 2004). In this context, teachers are expected to be trained how to use them.

The results of the research conducted show that teachers occasionally use digital technologies in their work with children of preschool age, which leads to the conclusion that the potential of those technologies is not sufficiently used. An important fact that needs to be emphasized refers to the use of digital technologies to a significantly greater extent by educators with shorter work experience, compared to their colleagues with longer work experience. The obtained findings can be interpreted by the fact that the category of younger participants have been trained to use them during their initial education and that they are readier to modernize their own practice. The smallest number of participants within the sample do not use digital technologies, which is a significant fact.

The most popular digital tool among the research participants is the Viber application, where a statistically significant difference was found between teachers' opinions about the digital tools used and their years of service. Participants with over 20 years of work experience use this application more often than those with shorter work experience. It is assumed that the educators favor Viber compared to other digital tools, due to its availability, ease of use and popularity in electronic communication.

Since this research placed special emphasis on the fields of speech development, environmental and music education, it was determined that in the field of speech development, best results are achieved when using digital technologies when realizing the content of language games and prose literary texts. In the field of environmental education, the learning content about animals and plants is most suitable for the use of digital technologies, and in the field of music education, those are the topics of listening to music and children's music games. The analysis of the participants' answers reveals that preschool teachers are partially trained in the use of digital technologies. The results show that the training of educators for their use depends on the length of work experience. Participants with more experience in working with children estimate that their digital competences are insufficiently developed. The conducted research has shown that a small number of educators attended professional seminars in the field of digital technologies, and that there is a need for additional training on how to use digital technologies in direct work with children, which provides opportunity for new research in this area.

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Biljana Novković Cvetković
University of Niš
Pedagogical Faculty in Vranje
Partizanska 14, 17500 Vranje, Serbia
Biljananovkovic74@gmail.com

Ana Spasić Stošić
University of Niš
Pedagogical Faculty in Vranje
Partizanska 14, 17500 Vranje, Serbia
anastosic974@gmail.com

Ivana Tasić Mitić
University of Niš
Pedagogical Faculty in Vranje
Partizanska 14, 17500 Vranje, Serbia
ivana.tasic82@yahoo.com

Aleksandar Stojadinović
University of Niš
Pedagogical Faculty in Vranje
Partizanska 14, 17500 Vranje, Serbia
stojadinovicaleksandar@gmail.com

Stavovi odgojitelja o primjeni digitalnih tehnologija u radu s djecom predškolske dobi

Sažetak

Digitalne tehnologije već se godinama koriste u nastavi na svim obrazovnim razinama. Njihova primjena posebno je došla do izražaja tijekom pandemije uzrokovane virusom COVID-19. Kao sastavni dio sustava institucionalnoga odgoja i obrazovanja, predškolski odgoj i obrazovanje područje je u kojemu je također nužna njihova primjena kako bi se osigurao cjeloviti proces skrbi, odgoja, obrazovanja i cjelovitoga pristupa učenju. S tim u vezi, cilj je provedenoga istraživanja utvrditi stavove odgojitelja o primjeni digitalnih tehnologija u realizaciji odgojno-obrazovnoga rada, s posebnim osvrtom na sadržaje razvoja govora, upoznavanja okoline i glazbenoga odgoja. Unatoč nužnosti njihove uporabe, rezultati istraživanja pokazuju da odgojitelji u nedostatnoj mjeri primjenjuju digitalne tehnologije u radu s djecom predškolske dobi. Prema mišljenju ispitanika, u području razvoja govora, prozni književni tekstovi i jezične igre najprikladnija su područja za korištenje ovih tehnologija. Kada je riječ o učenju o okolini, korištenje digitalnih tehnologija daje najbolje rezultate u realizaciji sadržaja o životinjama i biljkama. U realizaciji sadržaja glazbenoga obrazovanja za primjenu digitalnih tehnologija najpogodnija su područja slušanja glazbe i dječje glazbene igre. Viber aplikacija je digitalni alat koji ispitanici najčešće koriste u neposrednom radu s djecom. Dobiveni nalazi pokazuju da odgojitelji koji su prošli obuku za korištenje digitalnim tehnologijama smatraju da su djelomično osposobljeni za njihovo korištenje, kao i da je radni staž statistički značajan prediktor njihove uporabe. Provedeno istraživanje ukazuje na potrebu dodatnoga osposobljavanja odgojitelja za primjenu digitalnih tehnologija u odgojno-obrazovnom radu s djecom.

***Ključne riječi**: digitalna tehnologija, ekološki odgoj, glazbeni odgoj, predškolski odgoj, razvoj govora.*

Uvod

Tradicionalni sustav učenja u odgojno-obrazovnim ustanovama, počevši od ranoga i predškolskoga odgoja i obrazovanja, narušen je pandemijom COVID-19, koja je zahtijevala primjenu novih modela učenja. Epidemija je zahtijevala socijalno distanciranje od svih sudionika obrazovnoga procesa, što je podrazumijevalo prilagodbu *online*

učenju, korištenje digitalne tehnologije i prelazak na učenje na daljinu. Obrazovanje djece diljem svijeta zahtijevalo je novi i neočekivani oblik učenja koji je rušio granice prostora i vremena. Predškolske ustanove, škole i sveučilišta pokušali su educirati djecu od kuće u digitalnom okružju putem osobnih računala, tableta i mobilnih telefona. „Situacija s pandemijom pružila je priliku mnogim zemljama (osobito zemljama Zapadnog Balkana) da svoje obrazovne sustave učine učinkovitijima, inkluzivnijima i otpornijima te da podrže smanjenje digitalnoga jaza i poboljšanje digitalnih vještina odgojitelja uz uvođenje *online* nastave" (Grupacija Svjetske banke, 2020., 3, str. 1).

Prije izbijanja pandemije digitalne tehnologije nedovoljno su se i nesustavno koristile u predškolskom odgoju. Razlog tome može se tražiti u procesu inicijalnoga obrazovanja odgojitelja u kojem su nove tehnologije nedovoljno zastupljene, kao i postojećim programima stručnoga usavršavanja koji u ovom području gotovo da i nisu postojali (Stanisavljević Petrović i Pavlović, 2017). Odgojitelji nisu imali dovoljno prilika za razvoj digitalnih vještina. Najveći razlog tome leži u neopremljenosti predškolskih ustanova. S druge strane, nedovoljna obučenost i odgojitelja i roditelja za korištenje digitalnih tehnologija veliki je kamen spoticanja (Yildiz, Kilic, Acar, 2022). Ograničena primjena *online* učenja proizlazi prije svega iz ograničenoga iskustva ili vještina odgojitelja u korištenju digitalnih tehnologija. Programi stručnoga usavršavanja za odgojitelje moraju se više usredotočiti na razvoj vještina poučavanja povezanih s tehnologijom (Kim, 2020).

Studije o digitalnom učenju tijekom pandemijebolesti COVID-19 pokazuju da su odgojitelji u predškolskim ustanovama, ali i svi sudionici odgojno-obrazovnoga procesa, bili zatečeni pandemijom i zahtjevima koje je pandemija postavila pred obrazovni proces. Zatvaranjem škola odgojitelji, učitelji, učenici i roditelji suočili su se s raznim poteškoćama, a mnoge zemlje nastavile su svoje obrazovne aktivnosti u *online* okružju koristeći digitalne tehnologije (Spiteri, 2021; Van Lancker i Parolin, 2020; Jandrić, 2020; OECD, 2020; Zhang i sur., 2020).

S obzirom na to da su predškolske ustanove općenito bile suočene s preprekama pri integraciji tehnologije u svoj proces učenja zbog nedostatnih tehnoloških resursa, podrške, osobnoga iskustva i digitalnih vještina (Hu i Yelland, 2017.), ovaj iznenadni prijelaz zahtijevao je ponovno promišljanje uloga i vještina odgojitelja, koji mogu otvoriti put programima obrazovanja odgojitelja za osmišljavanje odgovarajućih pristupa i praksi za *online* poučavanje i učenje u obrazovanju u ranom djetinjstvu (Kim, 2020).

Bez obzira na nužnu primjenu u vrijeme pandemije, smatra se da digitalna tehnologija ima goleme prednosti u osuvremenjivanju obrazovanja u predškolskoj dobi i poticanju interakcije među svim sudionicima odgojno-obrazovnoga procesa. Postoje uvjerenja da korištenje digitalne tehnologije u predškolskom odgoju može pospješiti razvoj i odgojitelja i djece. Iako se ističu određeni rizici i ograničenja (McPake i sur. 2013; Plowman i sur. 2011), sve više djece predškolske dobi ima pristup internetu i koristi se digitalnim alatima. Digitalne tehnologije na ovoj razini obrazovanja pružaju mogućnosti za osmišljanje i izvođenje brojnih komunikacijskih i kreativnih aktivnosti (Kim,

2020). U predškolskom odgoju oni uključuju širok raspon digitalnih alata kao što su obrazovni softveri za djecu predškolske dobi, računala (stolno, prijenosno), mobilni uređaji (tablet, telefon), interaktivne ploče, elektroničke igračke, kamere, projektori itd.

Smatra se da nove tehnologije, ako su adekvatno integrirane u obrazovanje, mogu biti višenamjenske (Arsenijević i Andevski, 2011). S tim u vezi, *online* učenje zahtijeva integrirani pristup koji uključuje pristup digitalnim sadržajima, digitalne kompetencije odgojitelja i odgovarajuću opremu. Metode koje se koriste moraju biti prilagođene fizičkoj odvojenosti odgojitelja i djece te dobi. Samo ako su tehnologije prilagođene dobi djeteta, digitalni se sadržaj može pravilno usvojiti. U predškolskoj dobi odrasli igraju ključnu ulogu u procesu *online* učenja, jer djeca u toj dobi nemaju potencijala za samostalnost u ovoj vrsti učenja. Podrška odraslih sastoji se u organiziranju odgovarajućih aktivnosti uz određena sredstva. Iz tih razloga pozornost odgojitelja treba usmjeriti na stvaranje sigurnih uvjeta za *online* učenje kako bi se kod djece razvile sposobnosti razmišljanja, razumijevanja i korištenja digitalnih tehnologija nužnih za život u modernom društvu (Edwards i sur. 2018; Manches i Plowman 2017; McPake i dr. 2013).

Dosadašnja istraživanja

Mali je broj istraživanja o primjeni digitalnih tehnologija u predškolskom odgoju. Može se navesti nekoliko relevantnih za temu o kojoj se raspravlja. Istraživanje provedeno na reprezentativnom uzorku od 1560 odgojitelja, stručnih suradnika i ravnatelja u 25 ustanova na području Republike Srbije (Belenzada i sur., 2020) pokazalo je da odgojitelji rijetko koriste digitalne tehnologije u neposrednom radu s djecom. Mali broj njih ove tehnologije koristi za interakciju s djecom tijekom igre, kao i za dokumentiranje vlastite prakse, a izuzetno mali broj ih koristi u svrhu učenja i potpore razvoju ranoga opismenjavanja. Sudionici prepoznaju važnost korištenja digitalne tehnologije za izravnu komunikaciju s roditeljima, što se može objasniti činjenicom da je to bio jedini oblik komunikacije tijekom pandemije. Ovakvi rezultati u primjeni digitalne tehnologije ukazuju na nedostatnu osposobljenost odgajatelja za njezino korištenje, kao i na nedostatak digitalne opreme u predškolskim ustanovama. Proučavajući stavove sudionika iz istoga uzorka o potrebi unaprjeđenja vlastitih digitalnih kompetencija, utvrđeno je da, iako je samo 40 % praktičara prošlo stručno usavršavanje u ovom području, najveći broj (90 %) pokazao je spremnost za dodatno usavršavanje te su bili spremni koristiti digitalne tehnologije u radu s djecom predškolske dobi (Šaponjić i sur., 2020).

Istraživanje provedeno na uzorku od 101 odgojitelja koji rade u predškolskim ustanovama u trećem okrugu Atene pokazalo je da sudionici, među brojnim dostupnim digitalnim alatima, preferiraju e-učionicu, ocjenjujući je vrlo korisnom. To se može objasniti činjenicom da ga jednostavno mogu koristiti odgojitelji i djeca, nije potrebna dodatna obuka za njegovo korištenje te se lako može nadograditi i prilagoditi zahtjevima svih obrazovnih područja (Fotti, 2020).

Vezano uz dostupnost i korištenje računala u predškolskim ustanovama u Čileu, utvrđeno je da se na ovoj razini obrazovanja djeca u većoj mjeri koriste digitalnom tehnologijom u odnosu na učenike osnovnih i srednjih škola, unatoč činjenici da vrtići nisu dovoljno opremljeni a odgojitelji imaju nedovoljno razvijene digitalne kompetencije. Iako se spominju slične prepreke i izazovi pri korištenju računala na drugim razinama obrazovanja, odgoj i obrazovanje u predškolskoj ustanovi usmjereno je na postizanje ciljeva koji pridonose razvoju kompetencija i vještina potrebnih za život u suvremenom društvu. Korištenje računala u predškolskoj dobi ima specifičnu i konkretnu ulogu koja osigurava bolje rezultate i ishode u svim aspektima obrazovanja. To govori u prilog tome da je primjena računala, obrazovnih softvera i drugih tehnologija važna za usavršavanje pojedinih predmeta, što treba uzeti u obzir pri kreiranju obrazovne politike za ovu dobnu skupinu (Hinostroza i sur., 2013.).

Istraživanje provedeno u Francuskoj pokazalo je da prihvaćanje digitalnih tehnologija ovisi o uvjerenjima odgojitelja o važnosti korištenja obrazovnih aplikacija u predškolskom odgoju. U sklopu ovoga dvostupanjskog istraživanja najprije su procijenjena uvjerenja 214 odgajatelja o digitalnoj tehnologiji, a zatim je na poduzorku od 62 sudionika ispitano prihvaćanje primjene obrazovnoga tableta u neposrednom radu s djecom. Dobiveni rezultati upućuju na zaključak da je društveni status predškolske ustanove ključni čimbenik o kojem ovise uvjerenja i razina prihvaćanja digitalne tehnologije od strane odgojitelja. Odgojitelji koji rade s djecom s obrazovnim i socijalnim poteškoćama smatraju da je primjena digitalne tehnologije manje učinkovita u radu s njima, što je utjecalo i na njihovo manje prihvaćanje navedene aplikacije u odnosu na ostale sudionike (Horeau i sur., 2021).

Budući da je uporaba digitalne tehnologije došla do izražaja tijekom pandemije bolesti COVID-19, veliki broj studija o njihovoj primjeni proveden je upravo u ovom razdoblju. Tako je u Turskoj provedeno istraživanje na uzorku od 24 odgojitelja s ciljem utvrđivanja njihovih potreba i mogućnosti u pogledu načina organizacije i provedbe obrazovanja na daljinu. Najvažniji nalazi istraživanja provedenoga kroz intervjue pokazuju da sudionici nemaju dovoljno razvijene digitalne vještine te da postoji potreba za povećanjem broja interaktivnih resursa kao i obrazovnih platformi prilagođenih za rad s djecom predškolske dobi (Alan, 2021). Slično istraživanje u Turskoj provedeno na uzorku od 25 odgojitelja i 30 roditelja ispitivalo je posljedice pandemije na predškolski odgoj, pri čemu su glavna pitanja usmjerena na način njegove provedbe, organiziranje aktivnosti, izazove i mjere koje treba poduzeti kako bi se poučavalo pod takvim okolnostima. Sudionici su naveli da je pandemija bolesti COVID-19 imala brojne negativne učinke na predškolski odgoj. Zajedničkim radom na poučavanju turskoga jezika, matematike, znanosti, likovne umjetnosti i glazbe, učitelji i roditelji nastojali su pomoći djeci da razviju komunikaciju, suradnju, kritičko mišljenje i vještine rješavanja problema. Tijekom toga procesa suočili su se s brojnim poteškoćama i izazovima, a istaknuli su važnost poduzimanja mjera poput pružanja edukativnih mrežnih sadržaja koji bi pomogli predškolcima u razvoju kognitivnih, afektivnih i psihomotoričkih vještina (Yildirim, 2021.).

Postoje optimistična uvjerenja da će djeca kojoj je omogućen pristup digitalnoj tehnologiji u predškolskoj dobi postići bolja akademska i karijerna postignuća (U.S. Department of Education – Office of Educational Technology, 2017). Imajući ovo znanje na umu, Hurwitz i Schmitt (2020) istraživali su osiguravaju li digitalne vještine predškolske djece i korištenje interneta bolja postignuća u budućem obrazovnom procesu. Podatci su prikupljeni anketiranjem 101 američkoga roditelja o njihovoj djeci između 5 i 11 godina, odnosno o njihovim digitalnim vještinama, korištenju interneta i uspjehu u školi. Utvrđeno je da digitalne vještine stečene u ranom djetinjstvu značajno utječu na njihov razvoj tijekom kasnijega obrazovanja, što je pozitivno povezano sa školskim uspjehom. Kako bi se djeci omogućilo produktivno korištenje digitalne tehnologije, potrebno je pružiti podršku odgajateljima i roditeljima kako bi im pomogli u pravilnom razvoju digitalnih vještina. Kako bi budući odgojitelji bili osposobljeni za korištenje digitalnih tehnologija, potrebno je da imaju odgovarajuću obuku u procesu inicijalnoga obrazovanja na visokim učilištima. Baveći se ovim problemom, deskriptivna studija koju je proveo Kim (2020) otkrila je da je potrebno modificirati nastavu kako bi se omogućilo studentima, budućim odgojiteljima da izgrade vještine za izvođenje *online* nastave u proljetnom semestru 2020. u SAD-u. Opisujući tri faze kroz koje su prošli tijekom tečaja – pripremu, provedbu i refleksiju – studenti su dobili priliku komunicirati s djecom, što je dalo temelje za daljnja promišljanja o promicanju učenja djece predškolske dobi digitalnim alatima. Ovo istraživanje navodi na zaključak da razvoj digitalnih kompetencija odgojitelja treba podržati odgovarajućim strategijama poučavanja na fakultetima kao i *online* suradnjom s predškolskim ustanovama i obiteljima.

Istraživanje provedeno u Kini tijekom pandemije bolesti COVID-19 (Hong, Zhang, Liu, 2021) pokazalo je da odgojitelji imaju poteškoća u primjeni digitalne tehnologije zbog nedostatka iskustva. Percipirana dobrobit primijenjene tehnologije i jednostavnost njezine uporabe dvije su ključne značajke koje igraju središnju ulogu u procesu daljnjega usvajanja tehnologija, što je prikazano u ovom istraživanju, kao i u istraživanjima koja su rađena prije pandemije (Marangunić i Granić, 2015; Cigdem i Ozturk, 2016; Rafique i sur., 2018; Chen i Aklikokou, 2019). Nedovoljna osposobljenost odgojitelja za korištenje digitalnih tehnologija i nedovoljna tehnička opremljenost predškolskih ustanova veliki je kamen spoticanja za primjenu digitalnih tehnologija u predškolskim ustanovama (Celizić i Zovko, 2021; Yildiz, Kilic, Acar, 2022).

Metodologija

Budući da se od odgojitelja očekuje korištenje digitalne tehnologije u procesu predškolskoga odgoja i obrazovanja, provedeno je istraživanje s ciljem utvrđivanja trenutačnoga stanja primjene ovih tehnologija u odgojno-obrazovnom procesu djece predškolske dobi. Cilju istraživanja pristupilo se primarno iz aspekta korištenja digitalne tehnologije u direktnoj interakciji s djecom predškolske dobi. Istraživački zadatci odnosili su se kako na ispitivanje mišljenja odgojitelja o korištenju digitalne

tehnologije u neposrednom radu s djecom dobi od šest godina, prije polaska u školu, tako i na specifične digitalne alate koje najčešće koriste i njihovu osposobljenost za primjenu digitalnih tehnologija. Jedan od osnovnih zadataka odnosio se na područja metodike razvoja govora, ekološkoga i glazbenoga odgoja. S obzirom na karakter istraživanja, glavne primijenjene metode bile su deskriptivna znanstveno-istraživačka (anketna) metoda u naglašeno analitičkoj varijanti i metoda teorijske analize. Korištena tehnika istraživanja je anketa, dok je anketni upitnik s 20 pitanja zatvorenoga tipa glavni instrument kreiran za potrebe rada. Prvi dio upitnika sadrži pitanja o općim karakteristikama ispitanika, a u drugom dijelu pitanja su konstruirana po principu jednostrukoga i višestrukoga izbora. U radu su interpretirani dobiveni rezultati na devet pitanja relevantnih za temu rada. Statistička obrada podataka provedena je korištenjem frekvenci i postotaka. Likelihhod ratio test korišten je za ispitivanje odnosa dvije kategoričke varijable, s obzirom na mali broj ispitanika po kategorijama. Binarna logistička regresija korištena je za ispitivanje prediktivnih svojstava nezavisne promenljive. Obrada podaka izvršena je pomoću statističkoga programa SPSS ver. 25. Za utvrđivanje pouzdanosti upitnika korišten je Cronbachov alfa koeficijent koji je bio veći od 0,700, čime je potvrđena pouzdanost upitnika. Istraživanje je provedeno u veljači 2022. godine na uzorku od 318 odgojitelja zaposlenih u Predškolskoj ustanovi „Naše dijete" u Vranju.

Rezultati

U istraživanju koje je provedeno sudjelovalo je 318 ispitanika s različitim godinama radnoga staža. Najveći broj ispitanika, njih 122, je s radnim iskustvom od 21 do 30 godina, 94 ima radni staž od 11 do 20 godina, 81 ispitanik ima radno iskustvo od 31 do 40 godina, a najmanji broj, 21 odgojitelj, ima do 10 godina radnoga staža.

Na temelju dobivenih podataka, prikazanih u Tablici 1, odgovora na prvo pitanje doznaje se da najveći broj sudionika, njih 44,6 %, povremeno koristi digitalne tehnologije u radu s djecom predškolske dobi. Nešto manji postotak, 38,4 %, često ih koristi, a samo 16,9 % odgojitelja uopće ne koristi ove tehnologije u radu s djecom. Postoji statistički značajna razlika (p < 0,001) između sudionika u odgovorima s obzirom na duljinu njihovoga radnoga staža. Naime, odgojitelji s manje godina radnoga staža u značajno većoj mjeri koriste se digitalnim tehnologijama nego odgojitelji s više godina radnoga staža, što je i razumljivo jer se radi o mlađim odgojiteljima koji su otvoreniji korištenju inovacija. Odgojitelji s više godina radnoga iskustva navikli su na tradicionalni sustav rada i imaju otpor prema uvođenju inovacija u obrazovni proces, posebice prema primjeni tehnologija.

Budući da postoji širok raspon digitalnih alata namijenjenih korištenju u obrazovnom procesu, sudionicima je ponuđen popis tri za koje se pretpostavlja da se najčešće koriste - Viber, neke od platformi za e-učenje (Google učionica, Zoom, Moodle), e-pošta. Četvrta opcija ponudila je mogućnost sudionicima da navedu neki drugi digitalni alat koji najviše koriste. S obzirom da nitko od sudionika nije koristio ovu opciju, razmatrane

su samo prethodno ponuđene mogućnosti. Rezultati prikazani u Tablici 1 upućuju na zaključak da je Viber aplikacija najpopularniji digitalni alat koji su odgojitelji koristili u suradnji s roditeljima i djecom. Za ovu aplikaciju odlučilo se čak 73,9 % sudionika. Značajno manji postotak sudionika, njih 21,2 %, preferira e-poštu, a iznimno mali broj, njih 4,9 %, preferira neku od platformi za e-učenje. Testirana je razlika između ispitanika različite duljine radnoga staža u preferenciji korištenja digitalih alata u odgojno-obrazovnom procesu. Nalazi pokazuju da postoji statistički značajna razlika između odgovora sudionika i njihovoga radnog staža (p = 0,001). Sudionici s više od 20 godina radnoga staža češće koriste Viber od onih sa manje godina radnoga iskustva.

Viber je aplikacija koja se nalazi na mobitelu i najjednostavnija je za korištenje,te je samim time bila i najpopularnija. Pandemija bolesti COVID-19 izravno je potaknula razvoj mobilnoga učenja (Ralph i Petrina, 2019) i mogućnost da djeca uče *online* putem svojih telefona. Bilo da se radi o predškolskoj nastavi ili radnim sastancima, oni se mogu završiti *online*, putem mobilnih telefona (Power, 2019). Mobilno *online* učenje može igrati značajnu ulogu u multimedijskoj nastavi, omogućujući djeci predškolske dobi da ostanu usredotočeni na sadržaj. Proširenje pokrivenosti bežičnih mreža, povećanje brzine odziva mrežnih resursa i količine digitalnih resursa za učenje također će utjecati na učinkovitost *online* učenja za učenike (Zhou, 2022).

Kako bi se osigurala ispravna uporaba digitalnih tehnologija u procesu predškolskoga odgoja i obrazovanja, potrebno je osposobiti odgojitelje za njihovu primjenu. Samoprocjena gotovo polovine ispitanika (45,0 %) jest da su u potpunosti osposobljeni za njihovo korištenje. Njih 38,0 % smatra da su djelomično kvalificirani, dok 17,0 % ispitanika procjenjuje da nisu kvalificirani za korištenje digitalnih tehnologija u radu s djecom predškolske dobi. Očekivano, postoje razlike s obzirom na radni staž (p < 0,001). Sudionici s više iskustva u radu s djecom u značajno većoj mjeri smatraju da su djelomično ili nisu osposobljeni za korištenje digitalnih tehnologija nego kategorija sudionika s kraćim radnim iskustvom (Tablica 1).

Tablica 1

U provedenom istraživanju poseban naglasak stavljen je na realizaciju sadržaja uz korištenje digitalnih tehnologija u području razvoja govora, ekološkoga i glazbenoga odgoja. Rezultati su prikazani u Tablici 2. U okviru razvoja govora sudionici su imali priliku odabrati područja u kojima korištenje digitalnih tehnologija daje najbolje rezultate. Nude se sljedeća područja: jezične igre, obrada lirskih pjesama, obrada proznih književnih tekstova, priprema za početno čitanje i pisanje. Sudionici su najmanje pogodnima za primjenu digitalnih tehnologija ocijenili područja pripreme za početno pisanje (3,3 %) i čitanje (6,0 %), a nešto bolje rangirano je područje lirske pjesme (17,5 %). Sudionici smatraju da su digitalne tehnologije vrlo pogodne za prozne književne tekstove (30,1 %), dok primjena ovih tehnologija daje najbolje rezultate u obradi jezičnih igara (40 %). Likelihood ratio test pokazuje da ne postoji statistički značajna razlika (p > 0,05) između odgovora sudionika s obzirom na duljinu radnoga staža.

Kada je riječ o učenju o okolinni, postojala je mogućnost odabira sljedećih sadržaja: sadržaji o životinjama i biljkama, sadržaji o čovjeku kao prirodnom i društvenom biću, sadržaji o onečišćenju, sadržaji o prirodnim pojavama i svojstvima materijala, geografski sadržaji i sadržaj vezan uz promet. Najveći postotak sudionika odabrao je sadržaje o životinjama i biljkama (47,0 %) kao najprikladnije za korištenje digitalnih tehnologija. Značajno manji postotak odabrao je sadržaje o prometu (17,1 %) i sadržaje o prirodnim pojavama i svojstvima materijala (12,5 %), a gotovo isti postotak sadržaje vezane uz zemljopis (9,2 %) i sadržaje o čovjeku kao prirodnom i društvenom biću (8,4 %). Daleko najmanji broj odgojitelja procjenjuje da su sadržaji o onečišćenju (5,7 %) prikladni za poučavanje korištenjem digitalnih tehnologija. Ne postoji statistički značajna razlika (p > 0,05) u distribuciji dobivenih odgovora na ovo pitanje ovisno o godinama radnoga staža odgojitelja.

Pregledom rezultata koji su dobiveni na pitanje o sadržajima učenja u području glazbenoga obrazovanja u kojima se korištenjem digitalnih tehnologija postižu očekivani rezultati, dobiva se informacija da su ispitanici najviše dali prednost slušanju glazbe (26,5 %), te dječjim glazbenim igrama (22,4 %) i pjevanju pjesama (18,7 %). Manje prikladna područja za primjenu novih tehnologija su brojalice (13,5 %) i slobodno glazbeno izražavanje i stvaranje (12,4 %), dok se sviranje na dječjim glazbalima smatra najmanje prikladnim područjem za njihovu uporabu (6,3 %). Kao i u području razvoja govora i ekološkoga odgoja, ni u području glazbenoga obrazovanja nije utvrđena statistički značajna razlika u odgovorima sudionika različitoga radnog staža (p > 0,05).

Tablica 2

Korištenje digitalnih tehnologija u radu s djecom predškolske dob i u odnosu na varijablu stručnoga napredovanja u ovom području

Pretpostavlja se da odgojitelji koji su se stručno osposobili za primjenu digitalnih tehnologija stečena znanja primjenjuju u svojoj neposrednoj praksi. To je razlog što su na poduzorku ovih ispitanika ispitane njihove navike u korištenju digitalnih tehnologija. Dobiveni rezultati prikazani su u Tablici 3. Njih polovina (52,7 %) koristi veoma često digitalne tehnologije u radu s djecom, povremeno 35,1 %, dok ove tehnologije ne koristi 12,2 %. Promatrajući po godinama radnoga staža, kategorija ispitanika do 11 do 20 godina radnoga staža, koji su uglavnom prošli stručno osposobljavanje za primjenu novih tehnologija, često ih koriste u radu s djecom predškolske dobi. Isto tako, najstarija kategorija po godinama radnoga iskustva u najmanjoj mjeri primjenjuje digitalne tehnologije u procesu predškolskoga odgoja. Izuzetno je mali broj ispitanika iz svake kategorije staža koji ne koriste ove tehnologije. Ova razlika je statistički značajna, p = 0,002.

Na pitanje koje digitalne alate najčešće koriste u svojem radu, ispitanici koji su se stručno osposobili u ovom području, najčešće koriste Viber aplikcijom (73,0 %), zatim e-poštom (20,2 %), dok samo 6,8 % njih koristi neku od platformi za e-učenje. Učestalost korištenja pojedinih alata nije u statistički značajnoj vezi s duljinom radnoga staža odgajatelja (p = 0,754).

Utječe li obuka za korištenje digitalnih tehnologija na sposobnost odgojitelja da ih koristi procijenjeno je sljedećim pitanjem. Najbrojnija skupina ispitanika koji su prošli obuku za korištenje digitalnih tehnologija, odnosno kategorije s dužim radnim iskustvom (od 11 do 20 i od 21 do 30), procjenjuju da su djelomično osposobljeni za korištenje digitalnih tehnologija u odgojno-obrazovnom radu s djecom predškolske dobi. Podatci pokazuju da veliki broj odgojitelja do 10, te između 11 i 20 godina radnoga staža smatra da su potpuno osposobljeni za korištenje digitalnih tehnologija, dok je iznimno mali broj sudionika iz svih kategorija koji nisu osposobljeni. Ova razlika je i statistički značajna (p = 0,039).

Tablica 3

U Tablici 4 prikazani su podtaci koji se odnose na pitanje je li duljina radnoga staža statistički značajan prediktor uporabe digitalnih tehnologija u radu s djecom. Binarna logistička regresija pokazuje da je duljina radnoga staža statistički značajan prediktor korištenja digitalnih tehnologija (Exp(B) = 0,928, 95 % CI: 0,871 - 0,988, p = 0,020). Vrijednost Exp(B) ukazuje da se s povećanjem godina radnoga staža smanjuje mogućnost za primjenu digitalnih tehnologija u procesu predškolskoga odgoja i obrazovanja.

Tablica 4

Rasprava

Imajući u vidu da su moderne tehnologije neizostavan dio obrazovnoga sustava u gotovo svim razvijenim zemljama (Drigas i sur., 2015., Kuzmanović i sur., 2016., Gonzáles i Martin, 2018), u ovom se radu govorilo o njihovoj primjeni u procesu predškolskoga odgoja. Provedeno istraživanje ukazuje na podatak da odgojitelji povremeno primjenjuju digitalne tehnologije u odgojno-obrazovnom radu s djecom predškolske dobi. Slični su rezultati dobiveni u istraživanju suradnika Instituta za pedagoška istraživanja u Beogradu (Belenzada i sur., 2020). Odgojitelji s kraćim radnim iskustvom u svojem radu znatno češće primjenjuju digitalne tehnologije od svojih starijih kolega, što se može objasniti time da su se tijekom školovanja na visokoškolskim ustanovama obučavali za njihovu uporabu u određenim predmetima. Ohrabruje podatak da najmanji dio od ukupnoga broja sudionika ne koristi nove tehnologije u neposrednom radu s djecom. Za pripremu i izvođenje odgojno-obrazovnoga procesa odgojiteljima su na raspolaganju brojne vrste suvremene tehnologije. Za razliku od kolega u Grčkoj koji preferiraju e-učionicu (Fotti, 2020), najveći broj sudionika u uzorku provedenoga istraživanja preferira aplikaciju Viber, vjerojatno zato što se lako koristi. Podatak da odgojitelji s više od 20 godina staža koriste Viber češće od onih s manje godina radnoga iskustva, kako pokazuje ovo istraživanje, može se objasniti njegovom prisutnošću u svakodnevnoj komunikaciji.

Među različitim aspektima predškolskoga odgoja, središnja tema istraživanja je realizacija sadržaja učenja koji se odnose na razvoj govora, ekološki i glazbeni odgoj. Rezultati pokazuju da su jezične igre i poučavanje proznih književnih tekstova za sve

kategorije odgojitelja područja razvoja govora u kojima primjena digitalnih tehnologija daje najbolje rezultate. Kada je riječ o odgoju i obrazovanju za upoznavanje okoline, najveći broj sudionika, bez obzira na godine radnoga staža, smatra da su sadržaji o životinjama i biljkama najprikladniji za poučavanje korištenjem digitalnih tehnologija. Što se tiče glazbenoga obrazovanja, odgojitelji daju prednost slušanju glazbe, dječjim glazbenim igrama i pjevanju pjesama, u odnosu na druge aspekte glazbenoga obrazovanja u kojima korištenje novih tehnologija može dati učinkovitije rezultate. Sposobnost odgojitelja za primjenu suvremenih tehnologija neophodna je za njihovu uspješnu implementaciju. Studije provedene diljem svijeta pokazuju da su digitalne kompetencije odgojitelja nedovoljno razvijene (Alan, 2021; Hinostroza i sur., 2013). Slični su rezultati dobiveni i u ovom istraživanju, pri čemu najveći broj odgojitelja s dužim radnim iskustvom procjenjuje da su djelomično osposobljeni za korištenje digitalnih tehnologija u neposrednom radu s djecom predškolske dobi. Ipak, ohrabruje činjenica da kategorija sudionika s manje radnoga iskustva smatra da ima razvijene digitalne kompetencije.

Budući da se digitalne kompetencije razvijaju i unaprjeđuju kroz stručno usavršavanje, iznenađuje podatak da je samo četvrtina uzorka pohađala stručne seminare iz ovoga područja. Očekuje se da odgojitelji koji su se stručno usavršavali, a pripadaju kategoriji s manje godina radnoga staža, često koriste digitalne tehnologije u odgojno-obrazovnom radu. Isto tako, najstarija kategorija po godinama radnoga staža najmanje primjenjuje digitalne tehnologije u procesu predškolskoga odgoja, što se objašnjava činjenicom da tijekom formalnoga obrazovanja nisu imali priliku steći znanja o digitalnim tehnologijama. U vezi s tim, potvrđeno je da je duljina radnoga staža važan predskazatelj njihovoga korištenja. Viber aplikacija je najpopularniji digitalni alat među svim kategorijama odgojitelja koji su prošli edukaciju u ovom području. Kad je riječ o njihovoj osposobljenosti za primjenu novih tehnologija, istraživanje pokazuje da odgajatelji s kraćim radnim iskustvom koji su se stručno usavršavali za njihovu korištenje u znatno većoj mjeri smatraju da su potpuno osposobljeni za uporabu digitalnih tehnologija u odnosu na one s dužim radnim iskustvom.

Zaključak

Kako digitalne tehnologije utječu na odgojno-obrazovni proces na svim razinama obrazovanja (Kuzmanović i sur., 2019), njihov je učinak neminovno prisutan i u predškolskom odgoju. To je prva razina u sustavu institucionalnoga obrazovanja koja, uz brojne cjeloživotne kompetencije, daje temelje za razvoj digitalnih kompetencija djece. Brojni su razlozi koji ukazuju na važnost primjene digitalnih tehnologija u radu s djecom predškolske dobi. Prije svega, stvaraju poticajno okružje za razvoj i učenje djece predškolske dobi. Odgojiteljima se pružaju brojne mogućnosti za realizaciju odgojno-obrazovnoga rada, a s obzirom na novonastale životne okolnosti, postoji snažna potpora društvenoga sustava za integraciju i implementaciju digitalnih tehnologija u

sve segmente obrazovnoga procesa (Bolstad, 2004). U tom kontekstu od odgojitelja se očekuje da budu obučeni kako ih koristiti.

Rezultati provedenoga istraživanja pokazuju da odgajatelji povremeno koriste digitalne tehnologije u radu s djecom predškolske dobi, što upućuje na zaključak da potencijal ovih tehnologija nije dovoljno iskorišten. Važan podatak na koji se može ukazati odnosi se na korištenje digitalnih tehnologija odgojitelja s manje godina radnoga iskustva u značajno većoj mjeri u odnosu na kolege s više godina radnoga iskustva. Dobiveni nalazi mogu se tumačiti činjenicom da je kategorija mlađih polaznika osposobljena za njihovo korištenje tijekom inicijalne edukacije te da su spremniji osuvremeniti vlastitu praksu. Najmanji broj sudionika unutar uzorka ne koristi digitalne tehnologije, što je značajan podatak.

Najpopularniji digitalni alat među sudionicima istraživanja je aplikacija Viber, pri čemu je utvrđena statistički značajna razlika između mišljenja odgojitelja o korištenim digitalnim alatima i godinama radnoga staža. Sudionici s preko 20 godina radnoga iskustva ovu aplikaciju koriste češće od onih s kraćim radnim stažom. Pretpostavlja se da prednost koju odgojitelji daju Viberu u odnosu na druge digitalne alate jest u njegovoj dostupnosti, jednostavnosti uporabe i popularnosti u elektroničnoj komunikaciji. Budući da je ovo istraživanje poseban naglasak stavilo na područja razvoja govora, ekološkoga i glazbenoga odgoja, utvrđeno je da u području razvoja govora korištenje ovih tehnologija daje najbolje rezultate prilikom realizacije sadržaja jezičnih igara i obrade proznih književnih tekstova. U području odgoja i obrazovanja za okolinu sadržaji o životinjama i biljkama najpogodniji su za uporabu digitalnih tehnologija, a u području glazbenoga odgoja to su teme slušanja glazbe i dječje glazbene igre. Analiza odgovora sudionika otkriva da su odgojitelji djelomično osposobljeni za primjenu digitalnih tehnologija. Rezultati pokazuju da osposobljenost odgojitelja za njihovu uporabu ovisi o duljini radnoga staža. Sudionici s većim iskustvom u radu s djecom procjenjuju da su njihove digitalne kompetencije nedovoljno razvijene. Provedeno je istraživanje pokazalo da je mali broj odgojitelja koji su pohađali stručne seminare iz područja digitalnih tehnologija te da postoji potreba za dodatnim usavršavanjem za njihovo korištenje u neposrednom radu s djecom, što daje mogućnost za nova istraživanja u ovom području.