Original scientific paper

UDC:
373.2.011.3-051:004
37.018.43:004

Received: October 20, 2023.
Revised: December 01, 2023.
Accepted: December 10, 2023.

10.23947/2334-8496-2023-11-3-487-495

Check for updates

The Impact of the Application of rhe Online Teaching Model on the Development of Digital Competencies of Future Preschool Teachers

Gordana Stepić[1,3], Sonja Veličković[2], Olivera Cekić Jovanović[3], Andrijana Miletić[3]*

[1]State University of Novi Pazar, Department for Philosophy and Arts, Serbia, e-mail: gstepic@np.ac.rs
[2]Academy of Vocational Studies South Serbia, Department - High school for preschool teachers Bujanovac, Serbia
e-mail: svelickovic..sv@gmail.com
[3]University of Kragujevac, Faculty of Education in Jagodina, Serbia
e-mail: olivera.cekic@pefja.kg.ac.rs; andrijana.jakovljevic@yahoo.com

Abstract: In this study, the influence of the application of an online teaching model on the development of digital cometences of future teachers in preschool institutions was examined. The research that this study deals with was carried out on a sample consisting of N=125 students of the 3rd year of basic academic and professional studies in the study program of teacher in preschool institutions. As a research instrument, a five-point Likert-type scale of attitudes was used. The results show that there is a statistically significant difference in the attitudes of future teachers in preschool institutions when it comes to self-assessment of digital competencies before and after the implementation of online classes during the state of emergency in Serbia during the Sars-Cov-2 virus pandemic. The conclusion of the study is that the implementation of online teaching in processing the content of the Methodology of getting to know the environment affects the improvement of the digital competences of future educators when it comes to: 1) creating digital resources; 2) application of digital technologies in immediate educational work; 3) the role of digital technologies in professional development. The results of this research can be used to encourage teachers to step out of the usual pre-pandemic practice and enrich their pedagogical work with combined teaching (hybrid model) where part of the material would be analyzed in person, and part would be analyzed online using web tools, websites and videoconferencing applications.

Keywords: digital competences, online teaching, Methodology of teaching science.

Introduction

"Whether or not computers will enrich the learning environment of preschool children depends on the knowledge, skills and attitudes of preschool teachers. Colleges and universities for the education of future educators play an important role in providing opportunities for students to acquire appropriate knowledge, skills and positive attitudes towards the use of computers in preschool education" (Kutluca and Gokalp, 2011). In addition to compulsory and elective courses in the field of digital competence development attended at college / university, the indirect development of digital competence through various courses in which digital technologies are used to achieve the outcomes of these courses is of growing importance.

Kalogiannakis (2010) indicates that there is a gap between the ICT subjects attended by future preschool teachers at the university and the expected level of ICT use in the environment of preschool education, and points out that adequate education of future preschool teachers during their studies is of crucial importance for the application of digital technology in preschool. Shortcomings in the use of digital technologies found in preschool are determined by the following factors: study plans and training of trainers (Romero-Tena et al., 2020). This is in line with the opinion of preschool teachers who recognize the educational level and training in the field of digital technology as the most important factors influencing the application of digital technology in practice (Liu and Pange, 2015), and believe that they need additional training in this field during their professional development (Mikelić Preradović, Lešin and Boras, 2017).

*Corresponding author: gstepic@np.ac.rs

Training and professional development of educators, preparing them for the process of lifelong learning (Life Long Learning), monitoring trends and frequent changes in information and communication technologies is an unavoidable process that cannot be bypassed. The facts and results of research (published in the world and in our country) that indicate that the introduction of information technology into the preschool educational system is a response to the needs of children and in the interest of the child, represent one of the decisive driving factors for the active participation of educators in the process of integrating information and communication technologies in educational work. This determines the direction of the development of the program for the professional development of educators in practice, and certainly of students who are preparing for the profession of educators (Veličković, 2014).

On the other hand, the authors point out the attitudes (and skills) of ICT use as important factors, which shape their use in the preschool context (McCarrick and Li, 2007). Attitude is considered one of the decisive factors in predicting an individual's behavior (Tatalović Vorkapić and Milovanović, 2012). When it comes to the use of computers in preschool conditions, the attitude towards computers is defined as a "general assessment of a person or a feeling of acceptance or antipathy towards digital technology and computer-related activities" (Smith, Caputi and Rawstorne, 2000). Teachers who have more positive attitudes toward technology tend to integrate technology into their teaching (Marangunic and Granic, 2015). Other authors emphasize the importance of the intention of teachers as a factor that directly affects the use of digital technology in practice (Gialamas and Nikolopoulou, 2010). The authors also indicate that, in addition to knowledge and skills, attitudes and intentions, the self-perception of the possibility of using digital technology in practice by teachers will directly affect their integration (Romero-Tena et al., 2020). "Psychological context, especially of teachers' perception, is necessary for understanding the use of digital technologies in their daily duties" (Wang et al., 2008) since the perceptions that teachers have about the use of digital technologies can significantly affect the practice in kindergarten. If teachers believe digital technologies to be useful, they are more likely to adopt and use them without any difficulty (Oldridge, 2008). When a "new pedagogical approach or tool is presented, teachers make value judgments about whether that approach or tool is relevant to their goals. The more valuable the approach or tool is in their opinion, the more likely they are to use it" (Ottenbreit-Leftwich et al., 2010). Thus, although two teachers, after graduation, have the same level of knowledge and skills for the application of digital technologies in educational practice, positive / negative attitudes of educators and self-assessment will greatly affect the degree and quality of digital technology use in their future practice. However, if future teachers are provided with adequate training and practical application of digital technologies during their studies, it is likely that attitudes towards the use of computers in educational practice and their self-assessments will be more positive.

Taking into account the above findings and the situation caused by the Covid-19 pandemic, which forced higher education institutions around the world to intensify the use of numerous digital tools for online learning in working with students, we conducted a study that examined and compared the attitudes of future teachers on self-assessment of digital competencies, before and after the implementation of online classes during the summer semester 2019/2020.

Online teaching includes intentional and thoughtful support for student learning mediated by the Internet (Rapanta et al., 2020). Experiences of online learning through distance education can be asynchronous or synchronous. Asynchronous learning occurs when students can determine their own time to participate in learning through a variety of digital tools. Students can participate in communication and complete activities at a time of their choice and learn at their own pace. On the other hand, synchronous learning activities take place through live video and/or audio conferencing with instant feedback (Kim, 2020). The effectiveness of online learning depends on the designed and prepared learning material, the engagement of the lecturer in the online environment and the interaction between the lecturer and the student (Bao, 2020).

The transition from the usual way of working to online teaching, in response to the Covid-19 pandemic, contributed to professors and students finding themselves in a new environment and seeing the differences between the previous way of working and teaching online, but also to the improvement of their digital competencies. Online teaching has set new requirements for professors and students: the use of various digital tools and resources and the application of new approaches in teaching and learning (König, Jäger-Biela and Glutsch, 2020). However, teaching and learning online is not entirely new for professors and students. Digitization in schools / universities began even before the pandemic, and it is reflected in, among other things, equipping "schools / universities with appropriate equipment, striving to include ICT in curricula and giving students the opportunity to use advanced technological tools and digital resources for creative and innovative problem solving" (Kozma, 2011). The Covid-19 pandemic has accelerated the digital transformation of higher education and introduced innovations in

higher education, which would normally take much longer, immediately after the closure of schools / universities. The digital transformation has brought several challenges, and one of the main issues is that it has caused mandatory modifications in the attitudes of online teaching administrators, teachers and students about the importance of the Internet for learning (Kozma, 2011). Research has shown that current students, as Gen Z representatives, want to learn new skills and gain more experience in the field of digital technologies (Kamarianos et al., 2020). Globally, student satisfaction with the organization of three segments of the teaching process was quite high and almost the same on all continents: for lectures 3.30, tutorials and seminars 3.12, and mentoring 3.20 (Aristovnik et al., 2020). The authors believe that education, like all other segments of life and work, will never (and many should not) be the same, and that the crisis will have a lasting impact on learning, innovations and digitization (Aristovnik et al., 2020).

The specificity of the situation in which we found ourselves due to the Covid-19 pandemic put the issue of digital competencies of students to the forefront, regarding the monitoring and implementation of online teaching, as well as the level and possibilities for the development of these competencies. Our interest in this paper is focused on examining the possibility of improving students' digital competencies during the implementation of online teaching, indirectly, through the daily use of various digital tools for the purpose of learning, exchange and communication. Will students, future teachers, after three months of using digital tools for monitoring, implementation and evaluation of teaching have more positive attitudes about self-assessment of digital competencies and in which segments?

Materials and Methods

Research aim

The aim of this paper is to recognize the change in the attitudes of future teachers on self-assessment of digital competencies under the influence of the implementation of online teaching, during the spring semester 2019/2020. Specifically, it was about reviewing the attitudes of future teachers on the self-assessment of digital competencies before the implementation of online classes and after the end of the semester. We wanted to find out whether there was a change in attitudes about self-assessment of digital competencies of future teachers under the influence of online teaching, which included the use of various web tools for communication and cooperation, creating digital content and its application during teaching.

The research goal set in this way led to the following research task: Compare attitudes about digital competencies of future teachers in preschool institutions before and after the application of online teaching during the emergency situation in Serbia caused by the SARS-CoV-2 pandemic, through self-assessment of digital competencies.

Sample

The research sample consisted of third-year students of basic academic and vocational studies in the study program for the education of teachers in preschool institutions. The sample included N=125 students (57 respondents were from vocational studies (colleges for education of preschool teachers) and 68 from basic academic studies (study program Teacher in preschool institutions).

Instruments

The research presented in this study is a continuation of the research the results of which are presented in the paper published by Cekić-Jovanović, Stepić, Miletić (2020). Based on the results presented in the mentioned published study, as well as on the basis of previously studied literature and research results of other researchers in the field of digital competencies and application of educational technology, for the purposes of this research, a research instrument that was used was an electronic questionnaire in the form of a five-point Likert-type scale that examined the attitudes and self-assessment of digital competence of future teachers in preschool institutions before and after the implementation of online teaching during the spring semester. This questionnaire was also used by Cekić-Jovanović, Stepić, Miletić (2020) in their research, and its reliability was assessed by calculating the Cronbach's α reliability coefficient which is $\alpha = 0,83$, $\alpha > 0,7$. The first part included questions for collecting general data and information about the respondents (gender of respondents, their achievements in the Educational Methodology, the Environmental studies methodology, etc.). The second part was a five-point Likert-type scale, consisting of 26 statements (items). The statements in the questionnaire were formulated on the basis of the Rulebook on standards of competence for the vocation of preschool teachers and their professional development (Official Gazette of RS - Education Gazette, No. 16/2018), which is based on

DigComp 2.1. (Carretero, Vuorikari and Punie, 2017). The formulations of all statements are given in the study conducted by Cekić-Jovanović, Stepić, Miletić (2020), and they were used in this study as well, with minor changes.

Procedure

The beginning of the research presented in this paper deals with an initial examination of the attitudes of future teachers in preschool institutions (students of basic academic and vocational studies who are part of the study program Teacher in preschool institutions), through self-assessment of digital competencies before applying online teaching during an extraordinary situation. After the initial research, the students had online classes within the compulsory subject Environmental studies methodology for 3 months during the state of emergency in Serbia caused by the SARS-CoV-2 pandemic. Classes were mainly realized using the Google Classroom, video conferencing tool Zoom, Moodle platform and Edpuzzle application for editing interactive video materials. Students received teaching materials through these websites in the form of texts and video lessons, assignments were given via Google and Moodle platform, while they interacted with teachers and other students through discussions and analysis of teaching content via Zoom videoconferencing tool.

The end of the semester and online teaching was followed by the final examination of the attitudes of students / future teachers in preschool institutions on the self-assessment of digital competencies after the application of online teaching during an extraordinary situation. The final examination of attitudes included the same research instrument described earlier.

Analysis Procedures

In order to compare the attitudes of future teachers in preschool institutions, it was first necessary to examine the normality of the distribution of data obtained by applying the research instrument (a questionnaire) within the initial and final survey. As the sample of respondents is greater than 50, the results of the Kolmogorov-Smirnov test given in Table 1 show that the significance is greater than 0.05 (p = 0.2), which means that there is a normal distribution of data.

Table 1

Test of normality of data distribution in the initial and final examination of the attitudes of future teachers in preschool institutions

	Respondent's code	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
The sum of the claims	1-initial examination	,065	125	,200*	,981	125	,074
	2-final examination	,085	125	,026	,922	125	,000
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

By further using the t-test, we examined whether there was a statistically significant difference between the results of the initial and final examination, and whether the attitudes of future teachers in preschool institutions differed significantly before and after the implementation of online teaching.

If we summarize all the statements (Table 2), the t-test showed that the significance p=0.001 was less than 0.05, which means that there is a statistically significant difference in the results of the initial examination of attitudes compared to the final examination of attitudes, in favor of the final examination.

Table 2

T-test results

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
The sum of the claims	Equal variances assumed	-3,484	248	,001	-4,656	1,336	-7,287	-2,024

Results and Discussion

In general, after the realization of online classes during the spring semester, students estimated that they had better digital competencies compared to the initial examination of attitudes. If we look at the results obtained for each individual statement (Table 3) within the assessment scale, the t-test shows that there is a statistically significant difference in favor of the results of the final survey. Significance is less than 0.05 when it comes to self-assessment of digital competences related to the following statements / items (IT7, IT12, IT13, IT15, IT17, IT20, IT22, IT25, IT26): assessment of the quality, relevance, accuracy and scope of digital information (IT7); use of appropriate digital technologies for designing and creating the necessary educational materials for working with children in the realization of the planned learning situation in the field of Environmental studies (IT12); application and integration of digital technology in the immediate educational work, in the realization of the planned learning situation in the field of Environmental studies (IT13); multimedia presentation of content that is interactive and allows children to better understand and learn easier and faster in the field Environmental studies (IT15); application of digital technology that enables children to meaningfully use digital technologies for expression and learning through play within a topic or project in the field of Environmental studies (IT17); use of digital technologies that encourages children's decision making and critical thinking within the educational work in the field of Environmental studies (IT20); adequate attitude and habit of using digital technologies (IT22); use of digital technologies for professional development of teachers (IT25); control of shortcomings and dangers of digital technology application (IT26). For all the mentioned items, after the realization of online classes, the students estimated that they had better digital competencies compared to the period before the realization of online classes.

Table 3
Differences in students' attitudes

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
I use e-mail in my everyday life and during my studies.	-1,532	219,57	,127	-,144	,094	-,329	,041
In my daily life and during my studies, I use WWW - Internet databases.	,783	248	,435	,080	,102	-,121	,281
I use social networks in my everyday life and during my studies.	,537	248	,592	,032	,059	-,085	,149
I use digital technologies to exchange information	-1,243	248	,215	-,096	,077	-,248	,056
I use digital technologies to work in different bases	,682	248	,496	,056	,082	-,105	,217
I use digital technologies to summarize, compare and consolidate information	-,096	248	,923	-,008	,082	-,171	,155
I use digital technologies to judge the quality, relevance, accuracy and coverage of digital information	-4,030	248	,000	-,528	,131	-,786	-,269
I successfully use digital technologies in finding and collecting	-,411	248	,681	-,040	,097	-,231	,151
I successfully use digital technologies in planning	,255	248	,799	,024	,094	-,161	,209
I can effectively adapt, present and methodically transform	-1,195	240,940	,233	-,104	,087	-,275	,067
I can apply digital tools to organize and classify information	-1,323	248	,187	-,136	,102	-,338	,066
I use digital tools to design and create the necessary educational materials	-5,866	229,032	,000	-,696	,118	-,929	-,462

I am competent to apply and integrate digital technologies	-2,599	248	,010	-,264	,101	-,464	-,063
I am competent to evaluate and document in numerous ways	-,942	248	,347	-,072	,076	-,222	,078
I am competent to present multimedia content that is interactive	-4,322	193,14	,000	-,568	,131	-,827	-,308
Digital tools enable children to access information	,382	248	,703	,032	,083	-,132	,196
I am competent in enabling children to meaningfully use digital technologies for expression and learning through play	-2,453	248	,015	-,280	,114	-,504	-,055
I am competent to enable children to use digital technologies themselves to monitor their own learning	-1,270	248	,205	-,136	,107	-,346	,074
I am competent to enable children to progress at their own pace	,256	248	,798	,024	,093	-,160	,208
Modern technologies enable children to make decisions and think critically	-2,803	235,31	,005	-,312	,111	-,531	-,092
I adequately and safely use the advantages of digital technology	-,817	248	,415	-,072	,088	-,245	,101
An adequate relationship and culture of using digital technologies is necessary for every educator	-2,818	214,10	,005	-,328	,116	-,557	-,098
I am competent to develop awareness and habits for adequate use of digital technologies in children and parents	-1,162	248	,246	-,152	,130	-,409	,105
I am not competent enough to develop awareness and habits for adequate use of digital technologies in children and parents.	-1,909	248	,057	-,288	,150	-,585	,009
I believe that it is important that digital technology is used for the professional development of educators.	-3,028	218,37	,003	-,320	,105	-,528	-,111
I believe that, as a future educator, I am not always able to control the disadvantages and dangers of using digital technology.	-2,565	240,75	,011	-,360	,140	-,636	-,083

Further analysis of the research results shows that there is no statistically significant difference between the initial and final examination of the attitudes of future teachers in preschool institutions when it comes to self-assessment of digital competencies related to: the use of e-mail, WWW - Internet databases and social networks; the application of digital technology for information exchange; work in different databases for recording information about children, their parents, evaluation of educational work, etc.; summarizing, comparing and combining information from different digital sources; finding and collecting relevant information and educational materials for educational work in the field of Environmental studies; the use of digital technology in the planning of educational work in the field of learning Environmental studies; adaptation, presentation and methodological transformation in accordance with children's age and the topic of educational work in the field of Environmental studies; application of digital tools for organization and classification of information (charts, schemes, planners, schedules, mind maps, animations, video tutorials, etc.) in the field of Environmental studies; evaluation and documentation of data, photographs, digital texts, videos, etc.; the use of digital technologies as tools that enable children to access information during the implementation of educational work in the field of Environmental studies; enabling children to use digital technologies in monitoring their own learning; enabling children to make progress in educational work in the field of Environmental studies at their own pace, in a way that suits them best; adequate and safe use of the benefits of digital technology in educational work in the field of Environmental studies; developing awareness and habits in children and parents for the adequate use of digital technologies;

The results indicate that the students similarly assessed their digital competencies before and after

the realization of online classes during the pandemic. And that online classes did not significantly affect their self-assessment of digital competence in the mentioned areas.

The findings of one study indicate that self-assessments of digital competencies of future teachers in the areas of information and data, communication and collaboration and security are more than self-assessments in the areas of digital content creation and problem solving (Çebi and Reisoğlu, 2020). The authors explain this by having the focus on theoretical knowledge in teacher training programs, lack of practice for digital content development and technical problem solving, and the fact that future teachers feel more advanced in these areas, probably due to the use of digital technology in everyday life in terms of these areas (Çebi and Reisoğlu, 2020). We could say that the finding of our research is the opposite. During online classes, students had the opportunity to practically apply certain tools, to a greater extent than usual, and this resulted in a better self-assessment of digital competencies in the field of creating digital resources, direct work in educational practice and professional development. Analogous to the interpretation of the above research, we can assume that pedagogically designed use of digital technology during studies can lead to the improvement of digital competencies that are practiced during online classes.

Adequate initial training in the field of digital competence development "makes students better perceive themselves in their development of critical thinking, problem solving and decision making, and points to the fact that this will increase their creative capacity and influence them to be more innovative, as shown by findings obtained in various studies" (Romero-Tena, 2019; according to: Romero-Tena et al., 2020).

Expressing positive attitudes / intentions is just one of the factors for successful integration of ICT, which has an effect on professional development and education of teachers (Gialamas and Nikolopoulou, 2010), and, according to our results, vice versa. Shaping the pedagogical use of digital technology in working with students during online classes has proved important for improving attitudes about self-assessment of digital competencies.

It should also be borne in mind that teachers' pedagogical practices and behavior in practice are not static and are influenced by beliefs about the potential of ICT to improve learning as well as about the competence of teachers to integrate ICT into the curriculum (Webb and Cox, 2004). This means that even those teachers who have expressed positive attitudes or intentions may be disappointed and limit the use of digital technologies if they do not have continuity in professional development in this field (Gialamas and Nikolopoulou, 2010). This tells us that when it comes to application of digital technology, we need adequate and continuous support for students, future teachers, but also for practice teachers.

Conclusions

Based on the results presented in this study, it can be concluded that the implementation of online classes with students of basic academic and vocational studies who are part of the study program Teacher in preschool institutions has a positive effect on their attitudes and self-assessment of digital competencies.

Comparing the results obtained during the initial and final examination of students' attitudes, it can be seen that students believe that after the implementation of online classes they have more developed digital competencies related to: 1) creation of digital resources; 2) application of digital technologies in the immediate educational work and 3) role of digital technologies in professional development. Overall, differences between the initial and final measurements were not observed in the following fields: 1) use of digital technologies in everyday life; 2) work with information; 3) planning, monitoring and documenting; 4) respect for children's characteristics; 5) safe use of digital technologies.

These results tell us that practicing the use of digital tools during online classes has helped future teachers feel more confident in creating digital resources and applying digital technologies for chidren's learning and development, but, at the same time, they have become aware that they are not competent enough to assess the quality, relevance, accuracy and coverage of digital information and that they cannot always control the shortcomings and dangers of digital technologies.

When implementing online teaching or hybrid models in post-pandemic conditions, it is necessary to keep in mind the potential effects of certain objective and subjective factors that discourage teachers from opting for this way of working. The absence of adequate technical conditions for the implementation of teaching activities can be a significant objective factor. When it comes to subjective factors are concerned, they are mostly reflected in the approach of teachers and students. Hybrid and online teaching require highly motivated and creative teachers who will have to invest more time and effort to create different

learning activities and materials than those to which they and students were used to before the pandemic. Although web applications, such as Edpuzzle, Google Classroom, Zoom, etc., are quite easy to use, teachers, especially those with insufficient experience in the application of modern technology, may have difficulty with their implementation. Additional training, professional development and systematic support for the development of teachers' digital competencies would certainly contribute to a more successful implementation of hybrid teaching in post-pandemic conditions.

The results of this research can be used to encourage teachers to step out of the usual pre-pandemic practice and enrich their pedagogical work with combined teaching (hybrid model) where part of the material would be analyzed in person, and part would be analyzed online using web tools, websites and videoconferencing applications. This would certainly affect the improvement of digital competencies of students - future teachers in preschool institutions. The results of this study can also serve as a starting point for other researchers who want to examine this issue in more detail and more comprehensively, taking into account the possibility and need for online learning outcomes to be tested in different working conditions, learning environment, within other subjects, at other levels of education, on a different and larger sample of respondents, and so on.

Acknowledgements

The authors would like to thank the respondents who participated in the research and the reviewers who made a valuable contribution to the quality of the work by giving constructive suggestions.

Conflict of interests

The authors declare no conflict of interest.

Author Contributions

Conceptualization, G.S.,V.S.,O.C.J.; data curation, G.S. V.S. and A.M.; methodology, G.S., V.S., O.C.J. and A.M. resources, G.S. and V.S.; formal analysis, G.S., V.S., O.C.J. and A.M.; validation, O.C.J.; writing—original draft preparation, G.S., V.S., O.C.J. and A.M.; writing—review and editing, G.S., O.C.J. and A.M. All authors have read and agreed to the published version of the manuscript.

References

Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability, 12*(20), 8438. https://doi.org/10.3390/su12208438.

Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. *Human behavior and emerging technologies, 2*(2), 113-115. https://doi.org/10.1002/hbe2.191

Carretero, S., Vuorikari, R. & Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*, EUR 28558 EN, https://doi.org/10.2760/38842.

Çebi, A., & Reisoğlu, İ. (2020). Digital competence: A study from the perspective of pre-service teachers in Turkey. J*ournal of New Approaches in Educational Research (NAER Journal), 9*(2), 294-308. https://doi.org/10.7821/naer.2020.7.583.

Cekić-Jovanović, O., Stepić, G., Miletić, A. (2020). Future preschool teachers' atitudes about 21st-century digital skills, *Journal Plus Educati)on, 27*(2), 276-303).

Gialamas, V., & Nikolopoulou, K. (2010). In-service and pre-service early childhood teachers' views and intentions about ICT use in early childhood settings: A comparative study. *Computers & Education, 55*(1), 333-341. https://doi.org/10.1016/j.compedu.2010.01.019

Kalogiannakis, M. (2010). Training with ICT for ICT from the Trainer's Perspective. A Local ICT Teacher Training Experience. *Education and Information Technologies, 15*(1), 3–17. https://doi.org/10.1007/s10639-008-9079-3

Kamarianos, I., Adamopoulou, A., Lambropoulos, H., & Stamelos, G. (2020). Towards an understanding of university STUDENTS'RESPONSE in times of pandemic crisis (COVID-19). *European Journal of Education Studies, 7*(7), 20–40. http://dx.doi.org/10.46827/ejes.v7i7.3149

Kim, J. (2020). Learning and teaching online during Covid-19: Experiences of student teachers in an early childhood education practicum. *International Journal of Early Childhood, 52*(2), 145-158. https://doi.org/10.1007/s13158-020-00272-6.

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. *European journal of teacher education, 43*(4), 608-622. https://doi.org/10.1080/02619768.2020.1809650.

Kozma, R. B. (2011). ICT, education transformation, and economic development: An analysis of the US National Educational Technology Plan. *E-Learning and Digital Media, 8*(2), 106-120. https://doi.org/10.2304/elea.2011.8.2.106.

Kutluca, T., & Gokalp, Z. (2011). A study on computer usage and attitudes toward computers of prospective preschool teacher. *International Journal on New Trends in Education and Their Implications, 2*(1), 1-17.

Liu, X., & Pange, J. (2015, April). Early childhood teachers' access to and use of ICT in teaching: The case of Mainland China. In *Global Learn* (pp. 590-596). Association for the Advancement of Computing in Education (AACE).

Marangunić, N., & Granić, A. (2015). Technology acceptance model: a literature review from 1986 to 2013. *Universal access in the information society, 14*, 81-95. https://doi.org/10.1007/s10209-014-0348-1.

McCarrick, K. & Li, X. (2007). Buried Treasure: The Impact of Computer Use on Young Children's Social, Cognitive, Language Development and Motivation. *AACE Review (formerly AACE Journal), 15*(1), 73-95. Waynesville, NC USA: Association for the Advancement of Computing in Education (AACE). Retrieved December 3, 2023 from https://www.learntechlib.org/primary/p/19982/.

Mikelić Preradović, N., Lešin, G. & Boras, D. (2017). The Role and Attitudes of Kindergarten Educators in ICT-Supported Early Childhood Education. *Tem Journal, 6*(1), 162-172, https://doi.org/10.18421/TEM61-24.

Oldridge, L. (2008). Examining Early Childhood Teachers' Perceptions of ICT. Aust. Res. Early Childhood. *Educucation, 15*, 53–64.

Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & education, 55*(3), 1321-1335. https://doi.org/10.1016/j.compedu.2010.06.002

Pravilnik o standardima kompetencija za profesiju vaspitača i njegovog profesionalnog razvoja. ("Sl. glasnik RS - Prosvetni glasnik", br. 16/2018) [Official Gazette of RS - Education Gazette, No. 16/2018]

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital science and education, 2*, 923-945.

Ribeiro, R. (2020). How university faculty embraced the remote learning shift. EdTech Magazine. Retreived from https://edtechmagazine.com/higher/article/2020/04/how-university-faculty-embraced-remote-learning-shift

Romero-Tena, R., Barragán-Sánchez, R., Llorente-Cejudo, C., & Palacios-Rodríguez, A. (2020). The challenge of initial training for early childhood teachers. A cross sectional study of their digital competences. *Sustainability, 12*(11), 4782. https://doi.org/10.3390/su12114782.

Smith, B., Caputi, P., & Rawstorne, P. (2000). Differentiating computer experience and attitudes toward computers: an empirical investigation. *Computers in human behavior, 16*(1), 59-81. https://doi.org/10.1016/S0747-5632(99)00052-7

Tatalović Vorkapić, S. & Milovanović, S. (2012). Computer use in pre-school education: The attitudes of the future pre-school teachers in Croatia. Education 3-13: International Journal of Primary, Elementary and Early Years Educa-tion, 1-13. https://doi.org/10.1080/03004279.2012.673003

Veličković, S. (2014). Edukacija vaspitača za primenu IKT u vrtiću [Education of teachers for the application of ICT in kindergarten]. *Sinteza 2014-Impact of the Internet on Business Activities in Serbia and Worldwide*, 375-378. https://doi.org/10.15308/sinteza-2014-375-378

Vorkapic, S. T., & Milovanovic, S. (2014). Computer use in pre-school education: The attitudes of the future pre-school teachers in Croatia. *Education 3-13, 42*(2), 217-229. https://doi.org/10.1080/03004279.2012.673003

Wang, X.C., Jaruszewicz, C.,Rosen, D., Berson, I., Bailey, M., Hartle, L., Robinson, L. (2008). Meaningful technology integration in early learning environments. *Young Child, 63*, 48–51.

Webb, M., & Cox, M. (2004). A review of pedagogy related to information and communications technology. *Technology, pedagogy and education, 13*(3), 235-286. https://doi.org/10.1080/14759390400200183