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Investigation of Future Teachers' Digital Literacy and Technology Use Skills

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Abstract

It is essential for pre-service teachers to have digital literacy and technology use skills in order to integrate technology into education and training processes both effectively and efficiently. In this study, the digital literacy and technology use skills of pre-service teachers from different universities in Kazakhstan were examined comparatively in terms of some variables. The study was conducted with the participation of 209 pre-service teachers according to the survey and relational survey model. 'Digital Literacy' and 'Technology Use Skills' scales were used to collect the research data. According to the findings of the study, in general, pre-service teachers' technology use skills and digital literacy were found to be at a high level. The digital literacy and technology use levels of the participant pre-service teachers differed according to gender and grade level. The technology use skills of male participants were found to be higher than their female peers. It was also discovered that pre-service teachers studying in upper grades had high digital literacy and technology use skills. Finally, pre-service teachers' digital literacy significantly predicts their technology use skills.

Introduction

Instructional designs that are compatible with technology require the presence of teachers who will use these designs effectively and prioritize the centralization of the components of content, pedagogy and technology that will enable teachers to develop in technology (Koehler & Mishra, 2009). According to UNESCO's Information and Communication Technologies Competency Framework for Teachers, one of the most important topics of the 2030 Sustainable Development agenda is the inclusion of information and communication technologies in schools and classrooms. In this context, it is emphasized to create a competency framework for technological developments in the field of education through pre-service and in-service trainings (UNESCO, 2018). Teachers provide opportunities for students to explore the world of technology, benefit from collaboration with students and colleagues to improve their practices, update their designs to be student-centered to the extent that the conditions in the environment vary in a position to facilitate technology applications for students (ISTE, 2023). In addition to the national and international studies carried out to increase the competence of teachers, it is crucial

in terms of bringing teachers who use information and communication technologies effectively into the system, what kind of education prospective teachers undergo during their undergraduate education and to what extent they start their professional lives by gaining equipment (Nagima et al., 2023; Zhakupova et al., 2022).

Information and communication technologies (ICT) include the processes of accessing information quickly with digital technologies, creating and sharing information accurately (Tinio, 2003), and are tools that require new skills and enable meaningful and lifelong learning (Mikre, 2011). These tools are developing day by day, being included in daily life and their relevance to professions is increasing (Buckenmeyer, 2008; Abdigapbarova & Zhiyenbayeva, 2023). As a result, ICT has become widespread in educational settings and it has become a necessity for teachers to have ICT skills. Thus, interest in investigating the ICT skills and self-efficacy of teachers and pre-service teachers has increased (Briones, 2018; Hatlevik & Hatlevik, 2018; Galindo Domínguez & Bezanilla, 2021).

The most striking example of the interaction between education and technology has been experienced globally with the Covid-19 pandemic process. With the transition to distance education at all levels of education, the importance of the media/technology and materials used in the education process, as well as the importance of teachers using technology effectively on the success of the process has been understood (Brinia & Psoni, 2022; Maher & Zollman, 2021). In this process, many teachers developed their technological competencies (RiveraVargas et al., 2021). Online courses that came with the pandemic and the rapid increase in the use of web 2.0 applications in education have not been independent of technology (Lucas & Vicente, 2023). As a matter of fact, the development of technology progresses in parallel with the developments in science and science fields and has many common points in itself (Gilbert, Boulter & Elmer, 2000; Tajibayeva et al., 2023).

When the related literature is throughly examined, a limited number of studies on pre-service teachers' ability to use technology are found (Andersson, Ma & Streith, 2005; Cooper et al. 2019; Graham et al., 2009; Teo et al., 2008). Collis & Moonen (2008) found that pre-service teachers did not consider themselves competent in integrating software, technology and technology into education. Suharwoto & Niess (2001) found that teachers have serious deficiencies in utilizing educational technology. Manoucherhri (1999) found that teachers lacked knowledge about when and how to use computers in mathematics lessons. Kibici and Sarıkya (2021), in their study with music teachers and pre-service teachers, stated that there are many factors affecting technology integration. These factors are crowded classrooms, limited access, and insufficient knowledge of the teacher. As a matter of fact, at this point, it is seen that the readiness of pre-service teachers is not sufficient. However, in order to get efficiency from educational institutions, it is necessary to improve the technological equipment of teachers as well as the infrastructure of educational institutions (Herro, Visser & Qian, 2021). In this respect, it may be important to make prospective teachers aware of their deficiencies in terms of using technology and digital competencies.

The 21st century, referred to as the digital age or the information age, has brought technological innovations with it. Raising individuals equipped with 21st century knowledge and skills requires innovative educational approaches and the use of technologies appropriate to these approaches. When these technologies are integrated

into educational environments, both students' learning is supported and it becomes easier for them to adapt to the society in the digitalization process (Fraillon et al., 2019; OECD, 2015).

Integrating technology into the teaching process is seen as an important educational innovation to improve learning and teaching processes in the 21st century (Backfisch et al., 2021). However, research has shown that the presence of technologies to support learning and teaching processes often does not mean that they are integrated into the teaching process (Chauhan, 2017; Farjon et al, 2019). Therefore, in order to successfully integrate technology into the classroom, it is extremely important that teachers are competent in these areas. The emergence of new technologies and their widespread use in educational settings make the concepts of technology, pedagogy and domain important. In many studies in the literature (Janssen et al., 2019), it has been found that with a good combination of content knowledge, contemporary technologies and pedagogy with technology, teachers can use technology efficiently in their classrooms.

In studies conducted since the 1990s, pre-service teachers' technology integration self-efficacy perceptions have been identified as a prominent intrinsic factor affecting their performance in integrating technology into the teaching-learning process (Nathan, 2009). In the literature, it has been emphasized that teachers' self-efficacy perceptions towards technology use are an important determinant of their effective use of technology (Abbitt, 2011; Clark, Zhang & Strudler, 2015).

The concept of digital world is an expression that describes the world's digital information communication and interaction with computers and smart digital devices. The digital world has become one of the most widely used virtual tools in the real world due to technological developments. The rapid development in the digital world has led children to be referred to as digital natives, digital immigrants or digital hybrids and normalized digital communication. Children have become more active in the digital world, either playing interactive games or using the internet (Ng, 2015; Selwyn, 2012).

Universal access to data and the pursuit of knowledge has been an important element of global transformation. The mass reflections of this massive transformation show that the digital world is at the center of real lives. Digital technologies offer various possibilities and opportunities to educators and educated at every stage of education. Especially for children who meet digital technologies as soon as they open their eyes, it is almost impossible not to benefit from the opportunities offered by digitalization. Increasing use of technology in the field of education has facilitated access to educational content. Especially children who use tools such as computers, tablets and smart mobile phones by connecting to the internet can easily access the information they want. They can access educational environments and the information they want through mobile technologies. The effective use of this digital environment in face-to-face and distance education makes the roles of students and teachers in the digital world more prominent (Haleem et al., 2022; Sarker et al., 2019).

NETS-T provides a framework for teachers to define and develop skills for the use of digital technologies in education. The NETS-T standards are divided into five main categories: - Facilitate and inspire student learning and creativity - Design and develop learning experiences and assessments in the digital age - Model work and

learning in the digital age - Promote and model digital citizenship - Engage in professional domain development and leadership These categories cover the digital skills students need to succeed in the digital world and the instructional strategies teachers can use to teach these skills (NETS-T-Standards, 2008). The Unesco Qualification Framework for Teachers defines the competencies that teachers are expected to have in information and communication technologies (ICT). These definitions are designed to measure specific skills and abilities of teachers in how to use ICTs and how to teach their students. Competence in the use of ICT for teaching requires teachers to understand how to teach ICT technologies to their students and the strategies to support their learning. It is used for teachers' competencies in ICT technologies (UNESCO, 2018b). With these frameworks, which form the basis of digitalization studies in the field of education, the need for technology in the field of education, how to use it and why it is important are stated.

Digital literacy is defined as the ability to understand information in different forms presented in the computer environment (Gilster, 1997). Being digitally literate requires cognitive authority, security, privacy, creativity, ethical responsibility and the use of digital media. Individuals need to be aware of these characteristics (Meyers, Ericson, & Small, 2013). In addition, a digitally literate individual should be able to cope with the vast amount of information in front of them (Eshet-Alkalai & Soffer, 2012). He/she knows how to obtain the information he/she needs from digital sources and expresses how current, meaningful, necessary, valid and reliable the digital document is (Meyers, Ericson, & Small, 2013). Considering its positive effects, the importance of digital literacy in the educational environment becomes evident. Therefore, high digital literacy of pre-service teachers will enable them to prepare more effective environments in the educational process (Instefjord & Munthe, 2016).

Kimm et al. (2020) examined pre-service teachers' confidence in ISTE technology competencies. The findings of this quantitative study showed that pre-service teachers perceived that they had not yet reached a sufficient level of technology competence according to ISTE standards. Pre-service special education teachers with team teaching experience reported significantly higher levels of technology competence than the other groups. Alanazy and Alrusaiyes (2020) examined Saudi preservice teachers' perceptions of using information and computer technology. In this qualitative study, 88 pre-service teachers participated and responded to a needs assessment questionnaire. According to the findings obtained as a result of the research, pre-service teachers stated that they try to integrate computer technologies into their educational processes, but that more training courses are needed in this process.

Although the competencies of teachers in the global digital world is a difficult and complex issue, it is important to draw a general framework of these competencies (Biesta et al., 2020). For this reason, there are different definitions and classifications of digital competence and the digital competencies that teachers should possess (ISTE 2017; UNESCO 2018a; Redecker, 2017). A European framework for digital competences of educators [DigiCompEdu] was prepared by the European Commission (2006). In this framework, the digital competences that educators should have are stated as follows: Professional engagement: Using digital technologies for professional development, communication and collaboration Digital resources: Sharing and creating digital resources Learning and teaching: Using digital technologies in learning and teaching processes Assessment: Using digital technologies in assessment processes Empowering learners: Using digital technologies for students' active

participation and individual learning processes Increasing learners' digital competencies: Enabling learners to use digital technologies creatively and responsibly.

Pre-service teachers need to have digital competencies in order to effectively and efficiently integrate technology into education and training processes. The effective use of ICT in teaching, depending on the digital competencies of pre-service teachers, provides benefits such as students developing digital skills, developing their own innovative learning approaches and reducing failure. Teachers' digital competencies also enable them to develop their students' digital competencies (OECD, 2019). Today, technology use and digitalization play an important role in the field of education as it is effective in all areas. Teachers and teacher candidates who take an active role in the education process need to increase their digital skills. With digitalization, pre-service teachers teach in more interactive environments with students, which makes the learning experience more efficient. While digital tools increase the learning potential of students, they can also help teachers improve their teaching skills. Due to these realities, teachers need to have technology and digital skills and be able to apply them during teaching and learning. Therefore, it is of particular importance that prospective teachers, who are the teachers of the future, have these skills.

For this purpose, in this study, the digital literacy and technology usage skills of pre-service teachers in Kazakhstan were examined in a relational framework in terms of some variables. In relation to this purpose, answers to the following questions were sought in the study:

- What is the level of preservice teachers' digital literacy?
- What is the level of pre-service teachers' technology usage skills?
- Do preservice teachers' digital literacy and technology utilization skills differ according to gender variable?
- Do prospective teachers' digital literacy and technology utilization skills differ according to grade level?
- To what extent do pre-service teachers' digital literacies predict their technology use skills?

Method

In this study, a survey-type research model, which is one of the descriptive method models, was used. The aim of this study is to examine the relationships between pre-service teachers' digital literacy and technology usage skills comparatively in terms of some variables. The independent variables of this study consist of "gender and grade" variables. The dependent variables are digital literacy and technology usage skills. The survey method aims to reveal the current situation of the problem of interest and the problem to be investigated, and the current situation is studied within its own conditions and as it is. Descriptive data are obtained through information gathering methods such as questionnaires, interviews or observations (Fraenkel & Wallen, 2006). In this study, the relationships between digital literacy and technology usage skills were examined with the relational survey method. Relational research is research in which the relationship between two or more variables is examined without intervening in these variables in any way (Lau, 2017).

The study group of the research consisted of 209 pre-service teachers studying in the pedagogical program of

different universities in Kazakhstan in the 2022-2023 academic year. In the selection of the study group, convenience sampling, one of the non-probability (purposive) sampling techniques, was used. Convenience sampling is defined as sampling conducted on participants who are easy to include in the process, who are in the immediate vicinity and who voluntarily want to participate in the research (Duan et al., 2015). In the study, a balanced distribution of pre-service teachers in terms of gender and grade level was created.

Before the implementation of the scales used to collect data from the sample, a report summarizing the content of the study was prepared and permissions were obtained from the relevant university administrations. Then, it was determined that the scales would be given to the relevant classes of the randomly determined departments. Digital literacy and technology use skills scales were administered together at the agreed times. Before the implementation, the instructions related to the scale were read and a brief information about the implementation was given. The implementation lasted approximately 30 minutes. At the end of the implementation, the scales and answer sheets were collected according to the classes. No problems were encountered in the implementation.

Data Collection Tools

Personal information form, digital literacy scale and technology usage skills scale were used as data collection tools in the study.

Digital Literacy Scale

In order to determine the digital literacy levels of pre-service teachers, the "Digital Literacy Scale" developed by Ng (2012) and consisting of 17 items was used. The scale has a 4-factor structure. These factors are named as attitude, technical, cognitive and social. In the scale, a 5-point Likert-type rating was used as Strongly Disagree (1), Strongly Agree (5). There are no reverse-scored items in the scale. The highest score that can be obtained from the scale is 85 and the lowest score is 17. This scale was adapted into Kazakh by the researchers. The Cronbach's alpha coefficient calculated for the entire Kazakh form of the scale was found to be .90. The Cronbach's alpha coefficient of the sub-dimensions of the Kazakh form of the scale varies between .81 and .91. In this study, analyses were conducted on the average scores of the scale.

Technology Use Skills Scale

In the study, a scale was developed by the researchers by utilizing sample measurement tools in order to measure the technology use skills of pre-service teachers. In this context, the items of related scales developed by Schmidt et al. (2009) and Tondeur et al. The 5-point Likert scale consists of 25 items. The Likert form of the scale is ordered from strongly agree to strongly disagree and these statements are coded from 5 to 1. This scale was applied to a group of 222 people and its reliability and validity were tested. As a result of the factor analysis, three sub-dimensions emerged: 'computer and its use', 'internet and its use' and 'using technology for teaching purposes'. The reliability coefficient for the whole scale was found to be .89. The reliability coefficients for the sub-dimensions of the scale ranged between .83 and .89.

Data Analysis (Statistical Techniques)

The statistical analysis of the data was handled in a design to reveal the effects of independent variables on dependent variables. The score distributions obtained from both scales were entered into the computer by coding according to gender, department, grade and academic achievement variables. After the coding process, SPSS 26.0 package program was used for data analysis. Pre-analysis of the research data showed that the data obtained from the sample met the assumptions of normal distribution. In order to statistically analyze the problem statement and sub-problems of the study, the following analyses were performed: t-test was used to compare the dependent variables of pre-service teachers according to gender variable; analysis of variance (F test-ANOVA) was used to reveal the difference and degree of effect on dependent variables in terms of grade level and academic achievement perception variables; Multiple Regression Analysis technique was used to determine the relationships between digital literacy and technology usage skills.

Findings

In the study, firstly, descriptive analyses of the scores of pre-service teachers from the digital literacy and technology usage skills scales were carried out (see Table 1 and Table 2). In the second stage, the participants' digital literacy and technology use skills were analyzed according to gender and grade level (See Table 3 and Table 4). In the last stage, the relationships between the participants' digital literacy and technology use skills in the Kazakhstan pre-service teacher sample were tested with regression analysis.

Table 1. Descriptive Analysis of Preservice Teachers' Scores from the Digital Literacy Scale

	N	Minimum	Maximum	Mean	Std. Deviation
Technical	209	2.00	5.00	3.07	0.72
Attitude	209	2.00	5.00	4.54	0.69
Cognitive	209	2.00	5.00	3.45	0.60
Social	209	2.00	5.0	3.27	0.61
Digital Literacy	209	2.67	4.71	3.58	0.41

Table 1 shows the mean scores and standard deviations obtained from the digital literacy scale and its subscales. According to the analysis, mean values of 3.07 in the technical subscale of the digital literacy scale; 4.54 in the attitude subscale; 3.45 in the cognitive subscale; 3.27 in the social subscale and finally 3.58 in the whole scale were calculated. Although this average falls in the range of "partly=3", "mostly= 4" and "always= 5", it is closer to "mostly= 4". This means that pre-service teachers' digital literacy in technical and social dimensions is at a medium level, and their attitudes towards digital literacy in the cognitive domain at a high level are at a very high level. In general, it is seen that pre-service teachers' digital literacy is at a high level.

Table 2 shows the mean scores and standard deviations obtained by the pre-service teachers from the technology utilization skills scale and its sub-scales. According to the analyses, mean values of 3.29 in the "computer and its use" subscale, 4.05 in the "internet use" subscale, 3.20 in the "using technology for instructional purposes"

subscale and 3.51 in the whole scale were calculated. According to these values, it is understood that pre-service teachers' technology use skills in "computer and its use" and "using technology for instructional purposes" are at a medium level. On the other hand, it was seen that they had a high level of skill in the sub-dimension of "internet and its use". In general, it is seen that pre-service teachers' technology use skills are at a high level.

Table 2. Descriptive Analysis of the Scores Obtained by the Prospective Teachers from the Technology Use Skills Scale

	N	Minimum	Maximum	Mean	Std. Deviation
Computer and its use	209	2.00	5.00	3.29	0.54
Internet and its use	209	2.00	5.00	4.05	0.63
To be able to use technology for teaching purposes	209	1.86	4.14	3.20	0.64
Technology Use Skills	209	2.33	4.38	3.51	0.37

The averages obtained from the digital literacy scale were analyzed according to gender in Table 3. The mean of female pre-service teachers in the "Technique" subscale is 3.03, while the mean of male participants is 3.09. In the "Attitude" subscale, the mean of female participants is 4.55, while the mean of male participants is 4.53. In the "Cognitive" subscale, the mean of the female participants is 3.52 and the mean of the male participants is 3.40. In the social dimension, women scored 3.17 and men scored 3.34. Finally, in the whole scale, female and male pre-service teachers obtained mean values of 3.57 and 3.59, respectively. The t-test was used to determine whether the difference between the averages was statistically significant and the results are presented in Table 3.

Table 3. Comparison of Pre-Service Teachers' Scores from the Digital Literacy Scale According to Gender Variable

	Gender	N	Mean	Std. Deviation	t	p
Technical	Female	87	3.03	0.60	-0.55	0.58
	Male	122	3.09	0.80		
Attitude	Female	87	4.55	0.62	0.20	0.84
	Male	122	4.53	0.73		
Cognitive	Female	87	3.52	0.70	1.47	0.14
	Male	122	3.40	0.51		
Social	Female	87	3.17	0.57	-1.93	0.06
	Male	122	3.34	0.62		
Digital Literacy	Female	87	3.57	0.36	-0.37	0.71
	Male	122	3.59	0.44		

The difference between the averages was not significant (P >.05). In other words, there is no significant difference between the mean scores of male and female pre-service teachers obtained from the digital literacy scale. The fact that there is no difference between male and female pre-service teachers in terms of digital literacy is also very important in terms of the fact that these pre-service teachers, who will start teaching in the coming years, will

serve as a model for future generations as teachers.

The distribution of the averages obtained by the participants from the technology usage skills scale according to gender is shown in Table 4. The mean of female pre-service teachers in the "Computer and its use" subscale is 3.18, while the mean of male participants is 3.36. In the "Internet and its use" subscale, the mean of female participants is 4.05 and the mean of male participants is 4.04. In the "Using technology for teaching purposes" subscale, the mean of the female participants is 3.10 and the mean of the male participants is 3.27. Finally, in the whole scale, female and male pre-service teachers obtained mean values of 3.45 and 3.56, respectively. Whether the difference between the averages was statistically significant or not was examined by t-test and the results are presented in Table 4.

Table 4. Comparison of the Scores Obtained from the Scale of Technology Use Skills of Prospective Teachers According to Gender Variable

	Gender	N	Mean	Std. Deviation	t	P
Computer and its use	Female	87	3.18	0.49	-2.40	0.02
	Male	122	3.36	0.56		
Internet and its use	Female	87	4.05	0.68	0.11	0.91
	Male	122	4.04	0.60		
To be able to use technology for teaching purposes	Female	87	3.10	0.61	-1.92	0.06
	Male	122	3.27	0.65		
Technology Use Skills	Female	87	3.45	0.33	-2.24	0.03
	Male	122	3.56	0.38		

As seen in Table 4, no significant difference was found in the subscales of "Internet and its use" and "Using technology for teaching purposes" according to gender variable ($p>0.05$). On the other hand, a significant difference was found between the mean scores of male and female pre-service teachers in the "Computer use" subscale and in the whole scale. Male pre-service teachers were found to have higher levels of computer use and technology utilization skills compared to female participants.

In Table 5, the averages obtained from the digital literacy scale of the participant pre-service teachers were analyzed according to the grade level. According to the findings of One-Way Analysis of Variance, 5.57 F values were calculated in the "Technical" subscale, 0.31 F value in the "Attitude" subscale, 9.12 F value in the "Cognitive" subscale, 14.18 F value in the "Social" dimension and finally 12.42 F values were calculated in the whole scale in terms of grade level.

According to the F values in Table 5, no significant difference was found in the attitude dimension of the digital literacy scale in terms of grade levels ($p>0.05$). However, a significant difference was found in the other sub-dimensions and the whole scale according to the grade levels of the pre-service teachers ($p<0.05$). According to Tukey test analysis, pre-service teachers studying in grades 3 and 4 have higher literacy levels compared to participants in grades 1 and 2.

Table 5. Comparison of Pre-Service Teachers' Scores from Digital Literacy Scale According to Grade Level Variable

	Class Level	N	Mean	Std. Deviation	F	p
Technical	1	48	2.83	0.69	5.57	0.00
	2	49	2.94	0.69		
	3	65	3.11	0.66		
	4	47	3.38	0.77		
	Total	209	3.07	0.72		
Attitude	1	48	4.54	0.58	0.31	0.82
	2	49	4.59	0.70		
	3	65	4.48	0.79		
	4	47	4.57	0.62		
	Total	209	4.54	0.69		
Cognitive	1	48	3.09	0.62	9.12	0.00
	2	49	3.48	0.59		
	3	65	3.53	0.57		
	4	47	3.67	0.47		
	Total	209	3.45	0.60		
Social	1	48	2.98	0.67	14.18	0.00
	2	49	3.08	0.49		
	3	65	3.34	0.54		
	4	47	3.66	0.52		
	Total	209	3.27	0.61		
Digital Literacy	1	48	3.36	0.35	12.42	0.00
	2	49	3.52	0.38		
	3	65	3.62	0.40		
	4	47	3.82	0.36		
	Total	209	3.58	0.41		

The comparison of the averages obtained by the participants from the technology utilization skills scale according to the grade level is shown in Table 6. According to the variance analysis findings, an F value of 1.57 was calculated in the "Computer and its use" subscale, an F value of 0.30 in the "Internet and its use" subscale, an F value of 7.29 in the "Using technology for teaching purposes" subscale, and finally an F value of 4.22 in the whole scale.

According to the F values in Table 6, there is no significant difference in the "Internet and its use" subscale according to grade level. However, a significant difference was found in the other sub-dimensions and total of the technology utilization skills scale according to the grade level. According to Tukey test analysis, pre-service teachers studying in grades 3 and 4 have higher level of technology use skills compared to the participants in grades 1 and 2.

Table 6. Comparison of the Scores Obtained from the Scale of Preservice Teachers' Technology Use Skills According to the Grade Level Variable

	Class Level	N	Mean	Std. Deviation	F	P
Computer and its use	1	48	3.19	0.54	1.57	0.20
	2	49	3.22	0.51		
	3	65	3.37	0.52		
	4	47	3.35	0.59		
	Total	209	3.29	0.54		
Internet and its use	1	48	4.05	0.55	0.30	0.83
	2	49	4.09	0.67		
	3	65	3.99	0.72		
	4	47	4.09	0.55		
	Total	209	4.05	0.63		
To be able to use technology for teaching purposes	1	48	3.05	0.58	7.29	0.00
	2	49	2.99	0.61		
	3	65	3.25	0.66		
	4	47	3.52	0.57		
	Total	209	3.20	0.64		
Technology Use Skills	1	48	3.43	0.34	4.22	0.01
	2	49	3.43	0.32		
	3	65	3.54	0.40		
	4	47	3.65	0.35		
	Total	209	3.51	0.37		

The results of the multiple regression analysis on the prediction of digital literacy on technology usage skills of pre-service teachers are given in Table 7. According to the analysis, the regression coefficient between the two variables was calculated as 0.52. This coefficient is significant at 0.05 level. Pre-service teachers' digital literacy predicts their technology use skills at a significant level. According to the R2 value, approximately 26.7% of the change in technology use skills is due to digital literacy.

Table 7. Multiple Regression Analysis Results of Digital Literacy Predicting Technology Use Skills

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.84	0.19		9.52	0.000
Digital Literacy	0.47	0.05	0.52	8.75	0.000
$R= 0.52$; $R^2=0.267$; $F=76.64$; $p<0.05$					

Discussion and Conclusion

In this study, the digital literacy and technology utilization skills of pre-service teachers in Kazakhstan were examined comparatively in terms of some variables. According to the research findings, it was found that the digital literacy and technology usage skills of the participant pre-service teachers were at a high level. In the studies in the literature, it is stated that it is important for pre-service teachers to have a high level of digital literacy (Karakuş & Gürbüz, 2019; Khalid, Slættalíð, Parveen & Hossain, 2015). In addition, it is stated in the literature that the high level of digital literacy skills of pre-service teachers is important for professional development (Svensson & Baelo, 2015). In the information age, which is influenced by technological developments, it is almost impossible for educational environments to act independently from technology. The fact that technology is used effectively in all areas of life forces educational institutions to ensure technology integration. At this point, it is important that each individual working in the education sector can use technology effectively. Especially in the education sector, there are many studies on the training of teachers who are digitally literate and use technology effectively, serving and reflecting them to teaching processes (Burnett, 2011; EshetAlkalai, 2004; Hill, 2021; Ng, 2011; Shand et al., 2012; Wiyono, Indreswari & Prestiadi, 2021). In these studies, it is stated that there are significant improvements in the technology use skills and digital literacy of teachers and pre-service teachers, especially after the Covid 19 process (Gestiardi et al., 2021; Varela & Desiderio, 2021). However, in some studies, Benali, Kaddouri, & Azzimani (2018) and Lucas, Bem-Haja, Siddiq, Moreira, & Redecker (2021) found that pre-service teachers have moderate technology and digital competencies. In these studies, it is seen that only one measurement was made to reveal the digital competence levels of teachers and the studies were conducted before or at the beginning of the Covid 19 process. In this context, it may be recommended to conduct additional research including qualitative data collection processes in order to analyze the research finding in more depth.

In another sub-problem of the study, digital literacy and technology utilization skills of Kazakhstani pre-service teachers were compared according to gender variable. The digital literacy of pre-service teachers did not differ according to gender variable. However, significant differences were found between both genders in terms of technology usage skills. In terms of technology usage skills, male pre-service teachers had higher averages compared to their female peers. As a matter of fact, the results of many studies supporting these findings can be mentioned in the literature (Asimaki & Vergidis, 2013; Kara, 2020; Kibici & Sarıkaya, 2021; Roman Gonzalez et al., 2016 Sainz & Lopez-Saez, 2010; Sieverding & Koch, 2009). Similarly, it is emphasized in the literature that female teachers are more timid and have lower confidence in their ability to use technology (Mehloff, 2001). Similarly, Agbatogun (2010), Durndell and Haag (2002), Schumacher and Morahan-Martin (2001) show similar results showing that male teachers have more technology knowledge than female teachers. This situation was evaluated as male teachers being better in the dimension of technology use. The fact that the technology use skills and digital skills of male pre-service teachers are higher than the skills of female pre-service teachers can be considered as an important issue that needs to be investigated in terms of the teaching process in order for all students to receive similar quality education from male or female teachers, and the solution process can be planned.

Another variable addressed in the study is the comparison of Kazakhstani pre-service teachers' digital literacy and

technology utilization skills according to their grade levels. According to the analysis, significant differences were found in both digital literacy and technology use skills of pre-service teachers in terms of grade level. According to the research findings, pre-service teachers studying in upper grades were found to have higher digital literacy and technology use skills than the participants in lower grades. This may be because senior pre-service teachers are closer to entering the profession than first-year pre-service teachers, they think more about using technology for educational purposes, and they think that they have improved their ability to use technology for educational purposes by making presentations using technology in their lessons until they reach senior year. Studies conducted with teachers and pre-service teachers show that the frequency of using technology and technology competence increase with increasing grade level and professional experience (Russell, Bebell, O'Dwyer, & O'Connor, 2003; Van Braak, Tondeur, & Valcke, 2004). This situation can be associated with the fact that pre-service teachers use technological tools more and interact with technology more with the increase in their experiences related to the teaching profession.

Finally, the relationship between digital literacy and technology utilization skills of Kazakhstani pre-service teachers was analyzed. According to the regression analysis findings, it was found that preservice teachers' digital literacy significantly predicted their technology use skills. In this regard, Petrenko (2017) emphasized the importance of addressing digital literacy, technological readiness, software and hardware knowledge as an important component for the development of teachers' technology competencies, while Cha et al. (2011) emphasized the importance of including digital competencies, hardware and software designs and their applications in the curriculum in order to have competence in technology use skills. The ability of pre-service teachers to access information within the framework of digital literacy, to check the reliability of the information they access and to use this information within the framework of ethical rules will broaden the horizons of the student and support their educational life. For this reason, pre-service teachers should be digitally literate and use digital resources (Wetzel, Buss, Foulger, & Lindsey, 2014), which will enable the integration of technology with education and training (Meyers, Erickson, & Small, 2013).

Teachers' use of technology in the classroom will lead to higher student achievement. When pre-service teachers start to work, their attitudes and self-confidence towards using technology play an important role in whether they use technology in classroom applications and student achievement (Christanse, 2002; McGrail, 2005). Effective use of computers and technology in teaching is possible with teachers who are knowledgeable and well-trained in using technology. In today's world where education affects technology and technology affects education, a teaching approach that is not reflected in the educational environment and that lacks technology negatively affects success. For this reason, the use of computers and technology has become compulsory in today's education. In the light of the findings, various suggestions need to be made. In this direction, first of all, teacher trainers should educate, inform and raise awareness of pre-service teachers about digital literacy and technology usage skills, which are considered to be among the requirements of the 21st century and whose importance is expressed in many national and international studies in terms of the educational process. The courses that require the use of computer and technology should be given more weight so that the candidates studying in teaching programs can reach a better level to apply computer, internet and technology-supported teaching for teaching purposes.

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