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DETERMINATION OF DIGITAL COMPETENCIES OF PRE-SERVICE SPECIAL EDUCATION TEACHERS

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ABSTRACT

The aim of this study is to determine the digital competencies of pre-service special education teachers. A total of 192 pre-service special education teachers who are studying in special education teaching programs of universities affiliated to the Higher Education Institution in various provinces of Turkey participated in the study. 111 of the participants were female and 82 were male. In the study designed with a single survey model, data were collected with the Personal Information Form and the Basic Digital Competencies Scale for University Students. The data were collected through Microsoft Forms and analyzed using the Kolmogorov-Smirnow (K-S) Test. It was determined that the digital competencies of pre-service special education teachers were at a medium level. While there was no significant difference between the participants' digital competencies and gender and age, it was found that there was a significant difference between grade level, graduated high school and the status of receiving a training to develop digital competencies. It was determined that 4th grade pre-service special education teachers who participated in the study had more digital competencies than 1st grade pre-service special education teachers. It was determined that those who had previously received a training to develop digital competencies had more digital competencies than those who had not. In order for pre-service special education teachers to catch up with the age, it is recommended that they attend seminars on the development of digital competencies and the use of digital resources, follow and participate in training opportunities such as distance education, web browsing, web seminars, etc.

Keywords: Digital competencies, pre-service teacher, pre-service special education teacher.

INTRODUCTION

The concept of digital competence, which has become increasingly important in recent years, refers to the critical and creative use of the tools offered by information and communication technologies in all areas of life (European Parliament and the Council, 2007). There are different definitions of digital competence in the literature. For example, Ilomäki, Kantosalo, and Lakkala (2011), characterize digital competence as an emerging concept and state that it covers a large number of skills. Jahnsen at all. (2012), on the other hand, consider it as a concept that requires combining information management and information and communication technologies beyond the ability to use devices and applications. Regardless of which definition is taken as a basis, it is possible to say that digital competence is very prominent in every field today. In fact, it is stated that individuals lacking digital competence may face difficulties in the process of having a profession (European Commission, 2010). It will not be possible to think about digital competence, which is a necessity in every aspect of life, independently from education. Teachers are expected to be individuals with digital competencies in this context (Alarcón, Jiménez-Perez & Vicente-Yagüe, 2020).

Beyond having digital competencies, educators play a very important role due to their mission in helping societies gain competence in this field (Aberšek & Aberšek, 2022). There are some competencies that teachers should have in the process of incorporating technology into the educational process. These competencies are categorized under seven components: content, pedagogy, technology, technology content, technological pedagogy, pedagogical content and technological pedagogical knowledge (Koehler, Mishra, Kereluik, Shin, & Graham, 2014). Teachers are expected to have sufficient knowledge about their own fields in the education and training process, as well as using strategies to increase students' motivation, incorporating and using available technology into the education process, individualizing the curriculum on the basis of student needs, and reflecting this individualization to the learning process (Mishra & Koehler, 2006). Kelentrić, Helland and Arstorp (2017) lists the digital competencies that teachers are expected to have as subject skills and basic knowledge, school in society, ethics, pedagogy and subject teaching, leadership in learning processes, interaction and communication, change and development and emphasizes that each area is equally important.

The change in education programs over the years requires teachers to have high digital competencies in the process of providing the programs to students (Instefjord & Munthe, 2017). Undergraduate education is very important in ensuring digital competence in teachers. Teachers who receive training on digital competence during undergraduate education can use these competencies more effectively and efficiently in their professional lives (Tomte, Enochsson, Buskqvist, & Karstein, 2015). Otherwise, it can be said that it will negatively affect the students, who are the general outputs of the education system, in parallel with teacher competencies (Yazar & Keskin, 2016). It is emphasized that teachers' digital competencies are an important factor in the problems emerging in the education system. For this reason, teachers should improve themselves and courses that increase digital competence should be included in teaching programs (Hanell, 2018; Starkey, 2020).

As in every field of education, the importance of technology has gradually increased in the field of special education. Individualization of education, which is the most basic stage in the education of individuals with special needs, increases the importance of using technology in the services planned to be provided to individuals with special needs (Wehmeyer, Palmer, Smith, Davies & Stock, 2008). Technology can be used to support learning level, communication and independence skills in the education of individuals with special needs (Ergenekon, 2015). Technology-based teaching is also included in reports listing scientifically based practices (Wong, et al., 2014). This situation reveals that special education teachers should have high levels of technological competence in order to provide maximum efficiency to individuals with special needs in their educational processes.

In the literature review on teachers' digital competencies, no study on special education teacher candidates was found. However, there are studies conducted with teachers in different branches. The digital efficacy levels of teachers were found to be high (Arslan, 2019; Arslan, 2021; Demirdağ, 2021; Dias-Trindade & Gomes Ferreira, 2020; Erol & Aydın, 2021), medium (Gökbulut, Keserci, & Akyüz, 2021; Ocak & Karakuş, 2019; Süzer, 2022; Yontar, 2019), or low (Johannesen, Øgrim, & Giæver, 2014; Lindfors, Pettersson, & Olofsson, 2021). It is reported that teachers' digital competence levels do not change depending on the gender variable (Korucu et al., 2015; Polat, 2021). However, contrary to this finding, there are also studies that differentiate in favor of men (Arslan, 2021; Kaya, 2020; Yılmaz, et al., 2015). Another point where teachers' digital competencies differ is professional experience. It is reported that as the professional experience of teachers increases, their digital competencies decrease (Demirel, Sadi, & Dağyar, 2016; Keskin & Yazar, 2015). Another noteworthy variable expressed in the literature is the branch. It is noteworthy that research findings reveal that primary school teachers have higher levels of digital competencies compared to branch teachers (Kožuh, Maksimović, & Osmanović Zajić, 2021; Pettersson & Näsström, 2020). On a branch basis, it is stated that informatics, science, English and mathematics teachers have higher digital competence (Keskin & Yazar, 2015).

Regardless of the branch, it is emphasized in the literature that the content offered in teaching programs is important for teachers' digital competencies (Johannesen, Øgrim, & Giæver, 2014; Lindfors, Pettersson, & Olofsson, 2021). When considered in the context of special education teaching, teachers' high levels of digital competence are important for each stage of the education of individuals with special needs. An efficient education process will result in an increase in the possibility of these individuals to live independently. On the other hand, it should not be forgotten that every contribution to individuals with special needs will reduce the concerns of their families about the future lives of their children. In this context, it is important to determine the digital competencies of special education teachers.

The general purpose of this study is to examine the digital competencies of pre-service special education teachers. In line with this general purpose, the following sub-objectives were examined:

1. What is the level of digital competencies of pre-service special education teachers?

2. Do the digital competencies of pre-service special education teachers differ according to gender, age, grade level, type of high school graduated from and the status of receiving a training to develop digital competencies?

METHOD

Research Model

This research was designed with a single survey model. Research models conducted to determine the occurrence of variables individually, in terms of type or quantity are called single survey models. In this type of approach, the variables belonging to the event, item, individual, group, institution, subject, etc. unit and situation are tried to be described separately (Karasar, 2002).

Population and Sample

The population of the study consists of pre-service special education teachers in Turkey. The sample of the study was selected from the pre-service special education teachers who are studying Special Education Teaching in various provinces of Turkey and who volunteered to participate in the research among the pre-service special education teachers reached through social networking groups. Convenience sampling, also known as accidental sampling, is one of the non-probability sampling methods in which the target group of the research meets criteria such as easy accessibility, availability at a certain time, or volunteerism (Etikan et al., 2016). A total of 132 prospective special education teachers studying in the Department of Special Education in various provinces of Turkey participated in the study. The demographic characteristics of the participants are given in Table 1.

Table 1. Demographic Characteristics of the Participants

Variable	Category	N	%
Gender	Female	111	57,8
	Male	81	42,2
Age	18-25	146	76
	26-45	46	24
Grade Level	1. Grade	37	19,3
	2. Grade	27	14,1
	3. Grade	47	24,5
	4. Grade	81	42,2
Type of High School Graduated from	Anatolian High School (AL)	96	50
	Anatolian Imam Hatip High School (AİHL)	23	12
	Science High School (FL)	5	2,6
	Social Sciences High School (SBL)	9	4,7
	Vocational and Technical Anatolian High School (MTAL)	33	17,2
	Other	26	13,5
Receiving Training on Digital Competencies	Yes	23	12
	No	169	88

According to Table 1, 111 of the pre-service special education teachers participating in the study were female (57.8%) and 81 were male (42.2%). 146 of the participants were between the ages of 18-25 (76%) and 46 were between the ages of 26-45 (24%). 37 of the participants were in 1st grade (19.3%), 27 in 2nd grade (14.1%), 47 in 3rd grade (24.5%) and 81 in 4th grade (42.2%). 96 of the participants graduated from Anatolian High School

(AL) (50%), 23 from Anatolian Imam Hatip High School (AİHL) (12%), 5 from Science High School (FL) (2.6%), 9 from Social Sciences High School (SBL) (4.7%), 33 from Vocational and Technical Anatolian High School (MTAL) (33%) and 26 from other types of high schools (13.5%). 23 of the participants stated that they had received a training on digital competencies before (12%), while 169 had not (88%).

Data Collection Tools

Personal Information Form: The personal information form, which was created in line with the sub-objectives of the study, consists of 5 questions asking personal information such as gender, age, grade level, type of high school graduated from, and previous training on digital competence.

University Students Digital Competencies Scale: The original scale is the Basic Digital Competencies of University Students 2.0 - COBADI® scale developed by López-Meneses et al. (2013) based on the European Commission's Digital Competence (DigCom) framework. The scale was adapted into Turkish by Afacan-Adanır and Gülbahar-Güven (2022). The scale, which aims to measure the digital competencies of university students, is a 4-point Likert-type scale consisting of 5 factors and 29 items. The factors are named as Digital Content Development, Information and Data Literacy, Communication, University Virtual Tools and Social Communication, and Problem Solving. The Cronbach's Alpha reliability coefficient of the scale was found to be 0.904. Factor analyses confirmed the appropriateness of the scale according to validity and reliability studies. The scale is scored as 1-Totally Ineffective and 4-Totally Dominant, and the scores that can be obtained from the scale vary between 29 and 116. There are no reverse scored items in the scale.

Data Collection

In order to collect the data, the data collection tools were first digitized with Microsoft Forms. Then, the data collection tools were sent to the social networking groups of pre-service special education teachers studying in various provinces of Turkey and volunteer participants were asked to participate in the study. Data were collected in March 2023.

Data Analysis

In order to decide on the tests to be conducted to examine the digital competencies of the participants, the kurtosis and skewness values and the normality of the scale and subscale scores were tested with the Kolmogorov-Smirnow (K-S) Test (Can, 2017), which is applied when the group size is greater than 30, and the results are given in Table 2.

Table 2. K-S Test

	Z	Kurtosis	Skewness	*p*
University Students Digital Competencies Scale	,047	-,561	-,217	,200

As seen in Table 2, when the data collected with the University Students Digital Competencies Scale [(Z=,047 kurtosis=-,561, Standard error=,349; skewness=-,217, Standard error=,175); p>,05] are examined, it is seen that the data exhibit a normal distribution. Accordingly, Independent Sample t-Test was applied when the distribution was normal and the number of groups was two, and Analysis of Variance (ANOVA) was applied when there were more than two groups. Statistical significance level was accepted as .05. In the effect size calculation about the size of the significant difference obtained, the eta square (η^2) value was examined. For the t-test, the eta square (η^2) value was calculated with the formula [$\eta^2= t^2/ t^2+(n_1+n_2-2)$] and for the ANOVA results, it was calculated by dividing the variance between groups by the total variance. For the interpretation of the eta squared (η2) value, the cut-off points were taken as "small" at η^2=0.01, "medium" at η^2=0.06, and "large" at η^2=0.14 (Büyüköztürk, 2011; Can, 2017). In case the "F" value obtained as a result of one-way analysis of variance was significant, the necessary Scheffe and LCD tests were applied in cases where the variances were equal in order to determine which groups had a significant difference between the averages. The ethics committee permission of the article was obtained by Bolu Abant İzzet Baysal University/Publication Ethics Committee with the decision numbered 2023/87 dated 02.03.2023.

FINDINGS

The findings obtained in this study, which aims to determine the digital competencies of pre-service special education teachers, are given below.

1. What is the level of digital competencies of pre-service special education teachers?

Table 3. Mean and Standard Deviation of Participants' Scores on the University Students' Digital Competencies Scale

Dimensions	$\bar{X}$	S
Digital Content Development	16,24	5,33
Information and Data Literacy	29,17	7,40
Communication	9,73	2,36
The University's Virtual Tools and Social Communication	9,99	2,84
Problem Solving	7,45	2,28
Total	72,58	15,65

According to Table 3, the average score of the participants in the Digital Content Development dimension is 16.24. Considering that the lowest score that can be obtained from this dimension is 9 and the highest score is 36, it can be said that the scores of the participants are at a low level and the digital competencies of pre-service special education teachers in the Digital Content Development dimension are at a low level. The average score of the participants in the Information and Data Literacy dimension is 29.17. Considering that the lowest score that can be obtained from this dimension is 10 and the highest score is 40, it can be said that the scores of the participants are at a low level and the digital competencies of pre-service special education teachers in the Information and Data Literacy dimension are at a low level. The average score of the participants in the Communication dimension is 9.73. Considering that the lowest score that can be obtained from this dimension

is 3 and the highest score is 12, it can be said that the scores of the participants are at a medium level and the digital competencies of pre-service special education teachers in the Communication dimension are at a medium level. The average score of the participants in the Virtual Tools and Social Communication of the University dimension is 9.99. Considering that the lowest score that can be obtained from this dimension is 4 and the highest score is 16, it can be said that the scores of the participants are at a medium level and the digital competencies of the pre-service special education teachers in the dimension of Virtual Tools and Social Communication of the University are at a medium level. The average score of the participants in the Problem Solving dimension is 7.45. Considering that the lowest score that can be obtained from this dimension is 3 and the highest score is 12, it can be said that the scores of the participants are at a medium level and the digital competencies of pre-service special education teachers in the dimension of Problem Solving are at a medium level. The average score of the participants in the overall scale is 72.58. Considering that the lowest score that can be obtained from the scale is 29 and the highest score is 116, it can be said that the scores of the participants are at a moderate level and the digital competencies of pre-service special education teachers are at a moderate level.

2. Do the digital competencies of pre-service special education teachers differ according to gender, age, grade level, type of high school graduated from, and receiving a training to develop digital competencies?

a. The t-test results of the participants' scores on the scale according to gender

Table 4. The T-Test Results of the Participants' Scores from the University Students' Digital Competencies Scale According to Gender

Dimensions	Category	N	$\bar{X}$	S	Sd	t	p
Digital Content Development	Female	111	16,09	5,16	190	-,454	,651
	Male	81	16,44	5,59			
Information and Data Literacy	Female	111	29,44	7,25	190	-,589	,556
	Male	81	28,80	7,65			
Communication	Female	111	9,96	2,23	190	1,622	,106
	Male	81	9,41	2,50			
The University's Virtual Tools and Social Communication	Female	111	10,26	2,76	190	1,559	,121
	Male	81	9,62	2,91			
Problem Solving	Female	111	7,47	2,31	190	,146	,884
	Male	81	7,42	2,26			
Total	Female	111	73,23	15,22	190	,670	,504
	Male	81	71,69	16,28			

According to Table 4, the scale scores of the participants were analyzed by gender in terms of Digital Content Development [t(190)= -,454 p>.05], Information and Data Literacy [t(190)= -,589, p>.05], Communication [t(190)= 1,622, p>. 05], University's Virtual Tools and Social Communication [t(190)= 1,559, p>.05] and Problem Solving [t(190)= ,146, p>.05] dimensions and the overall scale [t(190)= ,670, p>.05] do not show a significant difference.

b. T-test results of the participants' scale scores according to age

Table 5. T-Test Results of the Participants' Scores from the University Students' Digital Competencies Scale According to Age

Dimensions	Category	N	X̄	S	Sd	t	p
Digital Content Development	18-25	146	16,47	5,32	190	1,079	,282
	26-45	46	15,50	5,38			
Information and Data Literacy	18-25	146	29,51	7,32	190	1,117	,265
	26-45	46	28,11	7,68			
Communication	18-25	146	9,91	2,31	190	1,917	,057
	26-45	46	9,15	2,44			
The University's Virtual Tools and Social Communication	18-25	146	10,03	2,84	190	,328	,743
	26-45	46	9,87	2,86			
Problem Solving	18-25	146	7,28	2,15	190	-1,820	,070
	26-45	46	7,98	2,61			
Total	18-25	146	73,20	15,44	190	,979	,329
	26-45	46	70,61	16,32			

According to Table 5, the scale scores of the participants were analyzed by age in terms of Digital Content Development [t(190)= 1,079 p>.05], Information and Data Literacy [t(190)= 1,117, p>.05], Communication [t(190)= 1,917, p>. 05], University's Virtual Tools and Social Communication [t(190)= 328, p>.05] and Problem Solving [t(190)= -1,820, p>.05] dimensions and the overall scale [t(190)= ,979, p>.05] do not show a significant difference.

c. Analysis of variance results of the participants' scale scores according to their grade level

Table 6. Analysis of Variance Results of the Participants' Scores from the University Students' Digital Competencies Scale According to Grade Level

Dimensions	Category	N	x̄	S	Sd	F	p
Digital Content Development	1. Grade	37	14,51	5,08	3	3,722	,012
	2. Grade	27	15,04	5,16			
	3. Grade	47	15,94	5,14			
	4. Grade	81	17,60	5,35			
Information and Data Literacy	1. Grade	37	27,19	7,73	3	2,252	,084
	2. Grade	27	28,04	8,45			
	3. Grade	47	28,83	8,10			
	4. Grade	81	30,65	6,22			
Communication	1. Grade	37	9,40	2,30	3	1,506	,214
	2. Grade	27	9,52	2,67			
	3. Grade	47	9,38	2,89			
	4. Grade	81	10,15	1,86			
The University's Virtual Tools and Social Communication	1. Grade	37	8,95	3,04	3	2,620	,052
	2. Grade	27	9,70	2,93			
	3. Grade	47	10,17	2,92			
	4. Grade	81	10,46	2,56			
Problem Solving	1. Grade	37	6,62	2,03	3	2,455	,065
	2. Grade	27	7,33	2,80			
	3. Grade	47	7,51	2,39			
	4. Grade	81	7,83	2,06			
Total	1. Grade	37	66,68	15,62	3	4,174	,007
	2. Grade	27	69,63	18,22			
	3. Grade	47	71,83	16,26			
	4. Grade	81	76,69	13,35			

According to Table 6, the participants' scores did not show a significant difference in Information and Data Literacy [(F(3)= 2,252), p>.05] Communication [(F(3)= 1,506), p>.05], Virtual Tools and Social Communication of the University [(F(3)= 2,620), p>. 05] and Problem Solving [(F(3)= 2,455), p>.05]; on the other hand, the Digital Content Development dimension [(F(3)= 3,722), p<.05, η^2=0.06] and the overall scale [(F(3)= 7,174), p<.05, η^2=0.06] showed a significant difference. On the other hand, the eta square (η^2) value was examined to calculate the effect size of the grade level variable. Accordingly, it was found that grade level had a moderate effect on the digital competencies of pre-service special education teachers in the Digital Content Development dimension and the overall scale.

Levene's test result was evaluated in order to decide on the post hoc tests to determine the source of the significant difference. As the variances of the groups were found to be equal, Scheffe test was applied and while a significant difference was found between the groups in the Digital Content Development dimension, no significant difference was found in the overall scale. Therefore, the LCD test, one of the post hoc multiple comparison tests, was applied for the overall scale and the results are given in Table 7.

Table 7. Scheffe/LCD Test Results of the Factors for Which There is a Significant Difference According to the Participants' Grade Level

	(I) Grade Level	(j) Grade Level	Mean Difference (I-J)	Standard Error	P
Digital Content Development (Scheffe)	1. Grade	1.2.Grade	-,52352	1,32	,984
		2.3. Grade	-1,42266	1,15	,674
		3.4. Grade	-3,09142*	1,04	,033
	2. Grade	1.1. Grade	,52352	1,32	,984
		2.3. Grade	-,89913	1,26	,917
		3.4. Grade	-2,56790	1,16	,183
	3. Grade	1.1. Grade	1,42266	1,15	,674
		2.2. Grade	,89913	1,26	,917
		3.4. Grade	-1,66877	,96	,389
	4. Grade	1.1. Grade	3,09142*	1,04	,033
		2.2. Grade	2,56790	1,16	,183
		3.3. Grade	1,66877	,96	,389
Total (LCD)	1. Grade	1.2. Grade	-,71171	,57	,214
		2.3. Grade	-,88902	,50	,074
		3.4. Grade	-1,20554*	,45	,008
	2. Grade	1.1. Grade	,71171	,57	,214
		2.3. Grade	-,17730	,54	,745
		3.4. Grade	-,49383	,50	,326
	3. Grade	1.1. Grade	,88902	,50	,074
		2.2. Grade	,17730	,54	,745
		3.4. Grade	-,31652	,41	,445
	4. Grade	1.1. Grade	1,20554*	,45	,008
		2.2. Grade	,49383	,50	,326
		3.3. Grade	,31652	,41	,445

As seen in Table 7, as a result of post hoc tests, it was determined that there was a significant difference between pre-service special education teachers attending 1st grade and pre-service special education teachers attending 4th grade in the Digital Content Development dimension ([Standard Error: 1,04], p<.05) and in the overall scale ([Standard Error: ,45], p<.05). Accordingly, it can be said that pre-service special education teachers attending

the 4th grade have more digital competence in the Digital Content Development dimension and in the overall scale than pre-service special education teachers attending the 1st grade.

d. Analysis of variance results of the participants' scale scores according to the type of high school they graduated from

Table 8. Analysis of Variance Results of the Participants' Scores from the Digital Competencies Scale of University Students According to the Type of High School They Graduated from

Dimensions	Category	N	x̄	S	Sd	F	p
Digital Content Development	AL	96	16,08	5,02	5	2,970	,013
	AİHL	23	14,87	5,70			
	FL	5	23,80	3,27			
	SBL	9	15,78	4,21			
	MTAL	33	17,39	6,05			
	Other	26	15,27	4,82			
Information and Data Literacy	AL	96	30,12	7,44	5	1,797	,115
	AİHL	23	27,04	7,13			
	FL	5	34,20	7,01			
	SBL	9	30,00	6,52			
	MTAL	33	28,81	7,84			
	Other	26	26,73	6,71			
Communication	AL	96	10,11	2,31	5	2,659	,024
	AİHL	23	9,43	2,21			
	FL	5	11,60	,89			
	SBL	9	10,11	2,09			
	MTAL	33	9,24	2,44			
	Other	26	8,69	2,45			
The University's Virtual Tools and Social Communication	AL	96	10,27	2,87	5	1,557	,174
	AİHL	23	9,22	2,71			
	FL	5	11,80	1,30			
	SBL	9	11,00	3,39			
	MTAL	33	9,70	2,76			
	Other	26	9,31	2,74			
Problem Solving	AL	96	7,67	2,28	5	,863	,507
	AİHL	23	6,74	1,74			
	FL	5	8,00	2,24			
	SBL	9	7,67	2,00			
	MTAL	33	7,09	2,57			
	Other	26	7,54	2,44			
Total	AL	96	74,260	15,14	5	2,573	,028
	AİHL	23	67,30	16,40			
	FL	5	89,40	12,66			
	SBL	9	74,56	14,50			
	MTAL	33	72,24	16,63			
	Other	26	67,54	13,96			

According to Table 8, the scores of the participants did not show a significant difference in the dimensions of Information and Data Literacy [(F(3)= 1,797), p>.05], University Virtual Tools and Social Communication [(F(3)= 1,557), p>.05] and Problem Solving [(F(3)= ,863), p>. 05]; however, it was determined that there was a significant difference in the Digital Content Development dimension [(F(3)= 2,970), p<.05, η^2=0,07], Communication [(F(3)= 2,659), p<.05, η^2=0,07] and the overall scale [(F(3)= 2,573), p<.05, η^2=0,06]. On the other hand, the eta square (η^2) value was examined to calculate the effect size of the type of high school graduated from. Accordingly, it

was seen that the type of high school graduated from had a moderate effect on the digital competencies of pre-service special education teachers in the Digital Content Development and Communication dimension and the overall scale.

Table 9. Scheffe/LCD Test Results of the Factors for Which There is a Significant Difference According to the Type of High School Graduated by the Participants

	(I) Graduated High School Type	(j) Graduated High School Type	Mean Difference (I-J)	Standard Error	P
Digital Content Development (Scheffe)	AL	1.AİHL	1,21377	1,21	,961
		2.FL	-7,71667	2,39	,068
		3.SBL	,30556	1,81	1,000
		4.MTAL	-1,31061	1,05	,905
		5.Other	,81410	1,15	,992
	AİHL	1.AL	-1,21377	1,21	,961
		2.FL	-8,93043*	2,57	,037
		3.SBL	-,90821	2,04	,999
		4.MTAL	-2,52437	1,41	,671
		5. Other	-,39967	1,49	1,000
	FL	1. AL	7,71667	2,39	,068
		2.AİHL	8,93043*	2,57	,037
		3.SBL	8,02222	2,90	,183
		4.MTAL	6,40606	2,50	,258
		5. Other	8,53077	2,54	,051
	SBL	1. AL	-,30556	1,81	1,000
		2.AİHL	,90821	2,04	,999
		3.FL	-8,02222	2,90	,183
		4.MTAL	-1,61616	1,96	,984
		5. Other	,50855	2,01	1,000
	MTAL	1. AL	1,31061	1,05	,905
		2.AİHL	2,52437	1,41	,671
		3.FL	-6,40606	2,50	,258
		4. SBL	1,61616	1,96	,984
		5. Other	2,12471	1,36	,787
	Other	1. AL	-,81410	1,15	,992
		2.AİHL	,39967	1,49	1,000
		3.FL	-8,53077	2,54	,051
		4. SBL	-,50855	2,01	1,000
		5.MTAL	-2,12471	1,36	,787
	AL	1.AİHL	,67980	,54	,206
		2.FL	-1,48542	1,06	,162
		3.SBL	,00347	,80	,997
		4.MTAL	,87216	,47	,063
		5. Other	1,42228*	,51	,006
	AİHL	1.AL	-,67980	,54	,206
		2.FL	-2,16522	1,14	,059
		3.SBL	-,67633	,91	,457
		4.MTAL	,19236	,63	,759
		5. Other	,74247	,66	,263
	FL	1. AL	1,48542	1,06	,162
		2.AİHL	2,16522	1,14	,059
		3.SBL	1,48889	1,29	,249
		4.MTAL	2,35758*	1,11	,035
		5. Other	2,90769*	1,13	,011
	SBL	1. AL	-,00347	,80	,997
		2.AİHL	,67633	,91	,457
		3.FL	-1,48889	1,29	,249

		4.MTAL	,86869	,87	,318
Communication (LCD)		5. Other	1,41880	,89	,114
		1. AL	-,87216	,47	,063
		2.AİHL	-,19236	,63	,759
	MTAL	3.FL	-2,35758*	1,10	,035
		4. SBL	-,86869	,87	,318
		5. Other	,55012	,61	,365
		1. AL	-1,42228*	,51	,006
		2.AİHL	-,74247	,66	,263
	Other	3.FL	-2,90769*	1,13	,011
		4. SBL	-1,41880	,89	,114
		5.MTAL	-,55012	,61	,365
		1.AİHL	6,95607	3,56	,052
	AL	2.FL	-15,13958*	7,03	,033
		3.SBL	-,29514	5,34	,956
		4.MTAL	2,01799	3,09	,515
		5. Other	6,72196*	3,39	,049
		1.AL	-6,95607	3,56	,052
	AİHL	2.FL	-22,09565*	7,57	,004
		3.SBL	-7,25121	6,03	,231
		4.MTAL	-4,93808	4,17	,237
		5. Other	-,23411	4,39	,958
		1. AL	15,13958*	7,03	,033
	FL	2.AİHL	22,09565*	7,57	,004
		3.SBL	14,84444	8,55	,084
		4.MTAL	17,15758*	7,36	,021
		5. Other	21,86154*	7,49	,004
		1. AL	,29514	5,35	,956
	SBL	2.AİHL	7,25121	6,03	,231
		3.FL	-14,84444	8,55	,084
		4.MTAL	2,31313	5,77	,689
Total		5. Other	7,01709	5,93	,238
(LCD)		1. AL	-2,01799	3,09	,515
		2.AİHL	4,93808	4,17	,237
	MTAL	3.FL	-17,15758*	7,36	,021
		4. SBL	-2,31313	5,77	,689
		5. Other	4,70396	4,02	,244
		1. AL	-6,72196*	3,39	,049
		2.AİHL	,23411	4,39	,958
	Other	3.FL	-21,86154*	7,49	,004
		4. SBL	-7,01709	5,93	,238
		5.MTAL	-4,70396	4,02	,244

As seen in Table 9, as a result of the post hoc tests, it was determined that there was a significant difference ([Standard Error: 2,57], p<.05) between the pre-service special education teachers who graduated from FL and the pre-service special education teachers who graduated from EFL in the Digital Content Development dimension. Accordingly, it can be said that pre-service special education teachers who graduated from FL have more digital competencies in the Digital Content Development dimension than pre-service special education teachers who graduated from EFL. There was a significant difference between those who graduated from other types of high schools and those who graduated from AL ([Standard Error: 3,39], p<.05) and FL ([Standard Error: 7,49], p<.05), as well as between those who graduated from MTAL and those who graduated from FL ([Standard Error: 7,36], p<.05) in the Communication dimension. Accordingly, it can be said that those who graduated from AL and FL have more digital competence in the Communication dimension than those who graduated from other types of high schools, and those who graduated from FL have more digital competence in the Communication

dimension than those who graduated from MTAL. It was determined that there was a significant difference between those who graduated from AL, EFL, MTAL and other types of high schools and those who graduated from FL and those who graduated from AL, EFL, MTAL and other types of high schools. It can be said that those who graduated from FL have more general digital competence than those who graduated from AL, EFL, MTAL and other types of high schools.

e. Analysis of variance results of the participants' scores on the scale according to the status of receiving a training to develop digital competencies

Table 10. T-Test Results of the Participants' Scores from the Digital Competencies Scale of University Students According to the Status of Receiving a Training to Develop Digital Competencies

Dimensions	Category	N	X̄	S	Sd	t	p
Digital Content Development	Yes	23	20,91	6,24	25,79	3,918	,001
	No	169	15,60	4,88			
Information and Data Literacy	Yes	23	31,35	6,38	190	1,506	,134
	No	169	28,88	7,51			
Communication	Yes	23	10,13	1,89	190	,869	,386
	No	169	9,67	2,41			
The University's Virtual Tools and Social Communication	Yes	23	11,17	2,29	190	2,154	,033
	No	169	9,82	2,87			
Problem Solving	Yes	23	8,35	2,35	190	2,033	,043
	No	169	7,32	2,25			
Total	Yes	23	81,91	14,30	190	3,118	,002
	No	169	71,31	15,43			

According to Table 10, the scale scores of the participants did not show a significant difference in Information and Data Literacy [t(190)= 1,506, p>.05] and Communication [t(190)= ,869, p>. While there is no significant difference in the dimensions of Digital Content Development [t(190)= 3,918, p<.05], Virtual Tools and Social Communication of the University [t(190)= 2,154, p<.05] and Problem Solving [t(190)= 2,033, p<.05], there is a significant difference in the overall scale [t(190)= 3,118, p<.05]. It can be said that those who have previously received a training to develop digital competencies have more digital competencies in the dimensions of Digital Content Development, Virtual Tools of the University and Social Communication and Problem Solving and in the overall scale than those who have not.

CONCLUSION and DISCUSSION

According to the findings of the study, it was determined that the digital competencies of pre-service special education teachers in the dimensions of Digital Content Development and Information and Data Literacy were at a low level, while their digital competencies in the dimensions of Communication, Virtual Tools of the University and Social Communication and Problem Solving and in the overall scale were at a medium level. In the study conducted by Yılmaz et al. (2015), it was determined that the perceptions of education faculty students towards the use of technology were at a medium level. Süzer (2022), Gökbulut, Keserci, and Akyüz (2021), Ocak and Karakuş (2019), Yontar (2019) concluded that the digital competence levels of the teachers participating in the study were at a medium level. Çoklar, Kılıçer and Odabaşı (2008) determined that the technology self-efficacy

of pre-service teachers was at a high level. Erol and Aydın (2021), Demirdağ, (2021) and Arslan (2019) determined that teachers' digital literacy levels were high in their studies. In order to increase digital competencies, it may be recommended to add technology-related courses to undergraduate programs and to include practical applications for the use of technology and digital resources for prospective teachers in addition to theoretical knowledge in these courses.

According to the other finding obtained in the study, there was no significant difference between the gender of the participants and the sub-dimensions and the overall scale. In parallel with this research, Polat (2021) and Korucu et al. (2015) concluded that the digital competence levels of pre-service teachers did not have a significant difference in terms of gender. In contrast to these studies, Aksoy et al. (2021), Aslan (2021), Kaya (2020) and Yılmaz et al. (2015) found that there were significant differences in favor of male pre-service teachers in their studies. Özalp (2022) concluded that there was no significant difference in favor of male and female teachers in their digital efficacy with teachers, but it was concluded that male teacher averages were higher than female teacher averages in each factor and scale total. Süzer (2022), Guillén-Gámez et al. (2020), Sırakaya (2019), Kartal et al. (2018) and Çelik (2017) also found that male teachers' digital competence levels were higher than female teachers. This can be explained by the view that men have a more positive attitude towards technology and are more interested in technology than women (Özalp, 2022). As a result of the studies, the fact that digital competencies cannot provide a consensus in terms of gender shows that the issue is open to research and in this case, it may be recommended to repeat the research on a larger sample group.

Another finding of the study was that there was no significant difference between the age of the participants and the sub-dimensions and the overall scale. Diz-Otero et al., (2022), Aksoy et al., (2021), Sırakaya, (2019) and Hakkari et al., (2015) found that age does not affect teachers' digital competencies. These results support the findings of this study. It is thought that the fact that age level does not affect digital competence levels may be due to the adequacy of environmental and technological opportunities or the similarity of pre-service teachers' perceptions about technology regardless of age (Kaya, 2020). Unlike the results of this research, Özalp (2022), Kazu and Erten (2016), Inan and Lowther, (2010) concluded that the digital competence levels of teachers decreased as their age increased. Considering that the new generation is developing in the age of technology, the fact that they interact more with technology may explain the fact that the digital competencies of young teachers are even higher (Kaya, 2020). At the same time, it can be explained as the fact that teachers with a high age level meet technology and digital tools later than young teachers and have difficulty in abandoning their habits (Güder & Demir, 2018).

A significant difference was found in terms of the participants' grade level and the type of high school graduated from in terms of the Digital Content Development dimension and the overall scale. It was determined that 4th grade pre-service special education teachers had more digital competencies in the Digital Content Development dimension and the overall scale than 1st grade pre-service special education teachers. It was seen that the grade level had a moderate effect on the digital competencies of pre-service special education teachers in the Digital

Content Development dimension and throughout the scale. In parallel with the results of this study, Bediroğlu (2021), Yılmaz et al. (2015), Kozan and Özek (2019) and Eser (2020) concluded that digital competencies showed significant differentiation according to the grades studied in their studies conducted with pre-service teachers.

It was determined that pre-service special education teachers who graduated from FL had more digital competence in the Digital Content Development dimension than pre-service special education teachers who graduated from EFL; those who graduated from AL and FL had more digital competence in the Communication dimension than those who graduated from other types of high schools; those who graduated from FL had more digital competence in the Communication dimension than those who graduated from MTAL; and those who graduated from FL had more general digital competence than those who graduated from AL, EİHL, MTAL and other types of high schools. It was seen that the type of high school graduated from had a moderate effect on the digital competencies of pre-service special education teachers in the Digital Content Development and Communication dimension and in the overall scale. It can be suggested that trainings should be given at high school level to inform and raise awareness about digital competencies and that these trainings should be applied.

According to the last finding obtained in the study, a significant difference was found in terms of the participants' previous training to develop digital competencies, Digital Content Development, Virtual Tools of the University and Social Communication and Problem Solving dimensions and the overall scale. It was seen that those who had previously received a training to develop digital competencies had more digital competencies in the dimensions of Digital Content Development, Virtual Tools and Social Communication of the University and Problem Solving and in the overall scale. The ability of pre-service teachers to access information, to check the reliability of the information they access and to use this information within the framework of ethical rules will expand the horizons of the student and support their educational life. Therefore, pre-service teachers need to be digitally literate and use digital resources (Ocak & Karakuş, 2018). Considering all these, it can be suggested that pre-service teachers should participate in seminars for the development of their digital competencies and the use of digital resources in order to catch up with the age, follow and participate in training opportunities such as distance education, web browsing, webinars, etc.

SUGGESTIONS

This study is limited to quantitative data. For further research, it may be recommended to obtain in-depth information by conducting qualitative interviews to determine the digital competencies of prospective special education teachers. It may be suggested to examine the digital competencies of pre-service teachers in different branches according to different variables using the same scale.

ETHICAL TEXT

This article complies with the journal's writing rules, publication principles, research and publication ethics rules, and journal ethics rules. The responsibility for any violations that may arise regarding the article belongs to the

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