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EVALUATION OF PROSPECTIVE TEACHERS' AWARENESS OF DIGITAL TRANSFORMATION IN THE CONTEXT OF VARIOUS VARIABLES[iii]

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Abstract:
Digital transformation is an important phenomenon that reshapes the pedagogical competences and teaching processes of teacher candidates in the field of education. In today's education system, digital transformation makes it mandatory for teacher candidates to adopt teaching methods integrated with technology. Digitalization in education is an important process that reshapes the pedagogical approaches and classroom interactions of teacher candidates. In this process, it is very important for teachers to have a positive awareness of digital transformation for a quality education-teaching process. In this context, the aim of the research was to determine the awareness levels of teacher candidates studying at a state university regarding digital transformation and the differentiation of these levels according to gender, age, branch and class level variables. The relational screening model, one of the quantitative research methods, was used in the research. Convenience sampling was selected to determine the sample for the research. In this context, data were collected from 287 teacher candidates. Teacher candidates consist of different branches studying at a Faculty of Education. 210 of the participants are female and 77 are male. The data of the study were collected with the "Awareness Scale on Digital Transformation in Education (DATE)" developed by Yurdakal (2023). The measurement tool in question consists of 3 dimensions and 50 items, and Cronbach's Alpha value is 0.957. The data of the study were analyzed with SPSS 22, and descriptive statistical methods (f) frequency, (%) percentage and (X) arithmetic mean analysis were performed, and t-test and ANOVA tests were used to determine the differences between independent variables. As a result of the study, it was concluded that the digital awareness levels of teacher candidates were high; these awareness

[i] ÖĞRETMEN ADAYLARININ DİJİTAL DÖNÜŞÜME İLİŞKİN FARKINDALIKLARININ ÇEŞİTLİ DEĞİŞKENLER BAĞLAMINDA DEĞERLENDİRİLMESİ

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levels did not change according to gender and age, and the class level and branch of education were effective on digital awareness levels.

Keywords: digital transformation, awareness, teacher candidate, screening model

Özet:
Dijital dönüşüm, eğitim alanında öğretmen adaylarının pedagojik yeterliliklerini ve öğretim süreçlerini yeniden şekillendiren önemli bir olgudur. Günümüz eğitim sisteminde dijital dönüşüm, öğretmen adaylarının teknolojiyle bütünleşik öğretim yöntemlerini benimsemesini zorunlu hale getirmektedir. Eğitimde dijitalleşme, öğretmen adaylarının pedagojik yaklaşımlarını ve sınıf içi etkileşimlerini yeniden şekillendiren önemli bir süreçtir. Bu süreçte, nitelikli bir eğitim-öğretim süreci için öğretmenlerin dijital dönüşüme ilişkin olumlu farkındalığa sahip olmaları oldukça önemlidir. Bu bağlamda araştırmanın amacı, bir devlet üniversitesinde öğrenim gören öğretmen adaylarının dijital dönüşüme ilişkin farkındalık düzeylerini ve bu düzeylerin cinsiyet, yaş, branş ve sınıf düzeyi değişkenlerine göre farklılaşmasını belirlemektir. Araştırmada nicel araştırma yöntemlerinden biri olan ilişkisel tarama modeli kullanılmıştır. Araştırmanın örneklemini belirlemek için elverişli örnekleme tekniği seçilmiştir. Bu bağlamda 287 öğretmen adayından veri toplanmıştır. Öğretmen adayları, bir Eğitim Fakültesinde öğrenim gören farklı branşlardan oluşmaktadır. Katılımcıların 210'u kadın, 77'si erkektir. Araştırmanın verileri Yurdakal (2023) tarafından geliştirilen "Eğitimde Dijital Dönüşüme Ilişkin Farkındalık Ölçeği (DFÖ)" ile toplanmıştır. Söz konusu ölçme aracı 3 boyut ve 50 maddeden oluşmakta olup Cronbach's Alpha değeri 0,957'dir. Araştırmanın verileri SPSS 22 programı ile analiz edilmiş olup betimsel istatistik yöntemlerinden (f) frekans, (%) yüzde ve (X) aritmetik ortalama analizi yapılmış, bağımsız değişkenler arasındaki farklılıkları belirlemek amacıyla t-testi ve ANOVA testleri kullanılmıştır. Araştırma sonucunda öğretmen adaylarının dijital farkındalık düzeylerinin yüksek olduğu; bu farkındalık düzeylerinin cinsiyet ve yaşa göre değişmediği, eğitim görülen sınıf düzeyi ve branşın dijital farkındalık düzeyleri üzerinde etkili olduğu sonucuna ulaşılmıştır.

Anahtar kelimeler: dijital dönüşüm, farkındalık, öğretmen adayı, tarama modeli

1. Introduction

Digital transformation is a process that has radically changed and continues to change the way information and communication technologies operate for individuals, institutions, and social relations. Although the start time of this process is not clear, the early 2000s can be considered as a starting point for digital transformation. Tang (2021) describes digital transformation as a transformation driven by emerging technologies. Digital transformation in education can be defined as the process of restructuring teaching methods, learning processes, and educational management processes through

digital technologies (Schwab, 2017). With digitalization, data-based decision-making, online learning environments, and artificial intelligence-supported teaching materials are becoming increasingly widespread in all areas of education. Digital transformation in education includes various technological and pedagogical components. These components are as follows:

1.1 Digital Learning Environments

With the digitization of traditional classroom environments, distance education platforms, augmented reality, and virtual reality-based course content are becoming widespread (Selwyn, 2016). These technologies contribute to students having an interactive and personalized learning experience.

1.2 Artificial Intelligence-Supported Education

Individualized learning experiences are offered using machine learning algorithms and natural language processing techniques. Artificial intelligence-supported systems can offer content according to students' learning speed and needs.

1.3 Use of Big Data and Analytics in Education

Data obtained from digital learning environments are used to analyze students' success and develop teaching strategies. Big data analytics support teachers' decision-making processes.

1.4 Hybrid and Online Learning Models

Hybrid models, which blend traditional face-to-face education with online learning, offer flexible and accessible educational opportunities.

The effects of digital transformation on education are multifaceted. While it offers individualized and accessible learning opportunities, it also raises issues such as digital inequality in education. Digitalization reshapes the pedagogical roles of teachers and encourages the adoption of student-centered learning models (Anderson, 2011). However, increasing teachers' digital pedagogical competencies is critical to the success of the digital transformation process.

The integration of digital transformation into the education system is carried out through various technological tools and platforms. In this process, distance education systems, artificial intelligence-supported learning environments, big data analytics, and digital teaching materials are increasingly being adopted. The COVID-19 pandemic, in particular, has shown that digitalization in education is inevitable and has accelerated the spread of distance education.

Digital transformation supports a student-centered learning approach by moving away from traditional teacher-centered teaching models. Online education platforms allow students to manage their own learning processes and offer materials that are appropriate for individual learning speeds (Prensky, 2005). Digital transformation plays an important role in increasing equal opportunities in education. Distance education

solutions facilitate access to education, especially for students living in disadvantaged areas. However, the problem of the digital divide should not be ignored. State policies and infrastructure investments are of vital importance for students who do not have access to digital technologies. The success of the digital transformation process depends on the development of teachers' digital pedagogical skills. Teachers should be able to use digital tools effectively and provide students with technology-supported learning experiences. For this reason, content for digital skills should be increased in teacher education programs (Redecker, 2017).

Thanks to digital technologies, educational materials can be constantly updated and adapted to changing information. Using online course content instead of printed books ensures that educational materials remain up-to-date. Digital transformation in education provides more flexible, accessible and effective learning experiences by restructuring teaching processes with modern technologies. Elements such as artificial intelligence, big data, augmented reality and distance education are shaping the future of education systems. However, in order for the digital transformation process to provide equal opportunities for all students, the digital gap needs to be reduced and teachers' digital skills need to be increased. The effective implementation of digital transformation in education requires focusing not only on technological infrastructure but also on pedagogical transformation. When 21st century competencies and digital transformation are considered together, the skills that a teacher in our age should have can be presented as follows:

- **Digital Literacy and Technology Use:** Teachers should be able to use digital tools effectively and provide these skills to their students.
- **Critical and Creative Thinking:** They should prepare students for the requirements of the digital age by supporting their problem-solving and innovative thinking skills.
- **Distance and Hybrid Learning Competence:** They should be able to plan online lessons, use distance education tools and create interactive learning environments.
- **Data Literacy:** They should be able to use tools such as big data and educational analytics to analyze students' learning processes.
- **Student-Centered Learning Approach:** They should develop student-centered, interactive and individualized learning strategies rather than traditional teaching methods.
- **Communication and Collaboration Skills:** They should be able to communicate effectively on digital platforms and be open to multidisciplinary and international collaborations.
- **Digital Ethics and Security Awareness:** They should guide students on cybersecurity, digital ethics and responsible internet use.
- **Adaptability and Continuous Learning:** They should be able to quickly adapt to technological developments and continuously continue their professional development.

- **Gamification and Interactive Learning:** It should be able to increase motivation by effectively using digital games and simulations in education.
- **Inclusive and Accessible Education Approach:** It should provide equal opportunities for disadvantaged students by using digital technologies.

Teachers with 21st-century skills should adapt to the requirements of digital transformation and provide students with effective, innovative and inclusive learning experiences. Being proficient in technology literacy, data analytics, distance education skills and digital ethics are among the most important qualifications of modern teachers (Voogt & Roblin, 2012). In addition, teachers should not only be people who transfer information, but also guide students in critical thinking, problem solving and digital security (Mishra & Koehler, 2006). Teachers who adapt to the dynamics of the digital age are among the most important actors shaping the education system of the future. Prospective teachers have a critical role in the digital transformation process. The effective use of digital technologies in education is directly related to teachers' digital pedagogical skills. While digital transformation in education reshapes teaching methods and learning processes, it is of great importance for prospective teachers to use technology effectively in this process. Therefore, developing the digital pedagogical competencies of prospective teachers should be an important goal in education faculties.

In the digital transformation process, teacher candidates assume various responsibilities such as developing technology-supported teaching materials, using online learning platforms, and supporting students' digital skills. Hybrid and online learning models that have replaced traditional teaching methods make teachers' digital skills even more important. Innovative approaches, especially artificial intelligence-supported educational tools, augmented reality applications, and big data analytics, require teacher candidates to increase their digital literacy levels.

The adaptation of teacher candidates to the digital transformation process also affects students' ability to benefit most from technology-supported learning environments. In the digital age, teachers are no longer just people who convey information, but rather guides who guide students in critical thinking, problem solving, and digital security. In this context, teacher candidates' adoption of digital pedagogical approaches and their ability to use digital learning materials effectively are among the elements that increase the quality of education. The role of teacher candidates in the digital transformation process is not limited to technology use skills. At the same time, pedagogical responsibilities such as educating students in accordance with the digital age and developing their critical and creative thinking skills are also among the duties of teacher candidates. Therefore, teacher training programs should be enriched with digital pedagogical content, and teacher candidates should be trained in accordance with the requirements of the digital age.

The ideal teacher profile of the future should consist of individuals who can use technology effectively, have critical thinking and problem-solving skills, and adopt student-centered teaching strategies. With digital transformation, teachers should not only be educators who convey information, but also guide, direct students, and support

their individual development. In addition, a teacher profile that can meet different learning needs and use innovative teaching methods should be created within the framework of an inclusive education approach (Darling-Hammond, 2017). In order to achieve this profile, courses that prioritize digital pedagogy should be included in the curriculum of education faculties. Teacher candidates should be able to use digital tools and learning platforms effectively and be competent in data literacy and educational technologies. In addition, teachers should be provided with 21st-century skills through interactive courses that develop critical thinking, communication, and collaboration skills. Internship programs should also go beyond traditional classroom experiences and include virtual classroom practices and hybrid education models.

Education processes should be structured in a way that ensures the professional development of teacher candidates is continuous. In this context, continuous education programs should be offered for teachers to adopt the concept of lifelong learning, and teacher candidates should receive practical training where they can experience innovative teaching techniques. Teacher education should not be limited to theoretical knowledge only, but should be supported by real-life scenarios, project-based learning, and digital skills training. In this way, future teachers will have the competencies to adapt to changing educational needs quickly and effectively. When the literature is examined, although there is no study focused directly on awareness of digital transformation in education, different studies have been conducted on similar topics.

Öztürk and Budak (2019) determined the self-assessments of teacher candidates about digital literacy and examined these assessments in terms of certain variables. In line with the findings obtained, it was determined that teacher candidates see themselves at a "Very Sufficient" level in terms of digital literacy. It was determined that teacher candidates' self-assessments of digital literacy differ significantly in terms of variables such as gender, grade level, and having a personal computer and social media accounts. It was concluded that the department in which the prospective teachers study and the duration of their daily internet use do not create a significant difference in their digital literacy assessments.

Çayak and Erol (2023) examined 48 theses and 54 articles in order to determine the status of our contemporary education systems regarding digitalization, and it was revealed that technological developments accelerate globalization and digital transformation, that there are some advantages and disadvantages of digitalization of education, that there are some obstacles to digital transformation in education, and that education stakeholders have different expectations from this process in the digital age.

Keskinkılıç and Kuk (2023) aimed to determine the EBA awareness levels of teachers in order to measure the effects of digital transformation on education, and from the findings obtained, it was concluded that the EBA awareness levels of teachers are at a good level.

Kurt, Ceylan, Bodur, and Yüksel (2023) discussed digital transformation and student values according to the opinions of teachers in their research. According to the results obtained from the research, the majority of the participants believe that digital

transformation is beneficial for educational activities. Teachers stated that the digital revolution improves teaching resources, accelerates communication, improves access to information, and improves the working conditions of students and teachers. They also emphasized the advantages of digital transformation for distance education. However, some educators have emphasized how digital change has a detrimental effect on students' morality.

Özdemir and Göztürk (2023) examined teachers' opinions about digital networks used in the field of education in their research. According to the results of the research, it was concluded that teachers benefit from many digital applications and programs in the field of education, that digital platforms are preferred especially in different subjects such as online exam preparation, watching lesson videos, sharing notes, preparing presentations and vocational training, and that there may be advantages and disadvantages of using digital networks in educational and instructional processes.

Özgül, Aktaş, and Özdemir (2023) examined the digital literacy levels of classroom teachers and classroom teacher candidates in terms of many variables. At the end of the study, it was observed that the digital literacy levels of classroom teachers were higher than those of classroom teacher candidates. In addition, it was found that male teachers had higher digital literacy levels than female teachers, younger teachers had higher digital literacy levels than older teachers, teachers with less professional experience had higher digital literacy levels than teachers with more professional experience, teachers in private schools had higher digital literacy levels than teachers in public schools, teachers with postgraduate education had higher digital literacy levels than teachers with undergraduate and associate degrees, and teachers with personal computers/tablets had higher digital literacy levels than those without. Finally, it was concluded that gender did not affect the digital literacy levels of classroom teacher candidates, that the highest digital literacy scores belonged to students between the ages of 22–23 and 3rd grade, and that teacher candidates with personal computers/tablets had higher digital literacy levels than those without.

Parlak, Yurdakul, Kalender and Üngör (2023) evaluated the innovative approaches that teachers encounter in digital transformation and education in their research. According to the results obtained from the research, the most effective strategies that teachers use to increase student success include effective use of digital tools, game-based learning, collaborative learning, use of audiovisual materials, repetition strategy, inquiry-based learning, research-examination strategy, individualized learning, mastery learning strategy and station strategy. The support and training that teachers need to integrate educational technologies include literacy, technology adaptation training, applied training in the use of technological tools, robotic coding, smart board use, artificial intelligence, course content preparation programs, STEM education, computer programming and educational technologies. Digital transformation increases teacher-student interaction, encourages positive attitude development, adaptation and collaboration, while increasing student motivation, providing permanent learning and more student participation. The use of learning materials and curriculum personalization

have been associated with factors such as adaptation to learning styles, use of appropriate materials, flexibility and diversity.

Savaş and Karadağ Yılmaz (2024) examined the digital reading cultures of classroom teachers and classroom teacher candidates in their research. As a result of the research, it was found that the majority of teachers and teacher candidates preferred digital reading because it provides fast and easy access to information, provides ease of access/transportation, and is economical.

Şenbahar, Merdan, Oğuz and Yeşilnacar (2023) evaluated the effects of digital transformation in education on education management according to teachers' views in their research. According to the research results, teachers' views reflect the effects of digital transformation on school management and student success. The use of digital tools and communication tools has provided teachers with great convenience in student follow-up and communication. However, there are also difficulties, such as technical problems and student inequalities. In addition, it is stated that digital transformation requires adaptation for teachers and is important in guiding students. These views emphasize the complexity of digital transformation in education and the need for planning and training for a successful implementation. A process suitable for the needs of the age is essential for a quality education-training service. In this context, it is important to train individuals who can adapt to the digital transformation process, especially in the information age, and who have gained awareness of this process. In this training process, teachers and teacher candidates, who are the teachers of the future, have great responsibilities. Determining the awareness levels of teacher candidates regarding digital transformation can both help see the current situation and especially lead to questioning the course content of education faculties. In this context, this study aimed to determine the awareness levels of teacher candidates regarding digital transformation in education and to examine the changes in these levels according to different variables. In this context, the following sub-problems were created:

1) What are the awareness levels of teacher candidates regarding digital transformation in education?
2) Do teacher candidates' awareness levels regarding digital transformation in education vary by gender?
3) Do teacher candidates' awareness levels regarding digital transformation in education vary by age?
4) Do teacher candidates' awareness levels regarding digital transformation in education vary by grade level?
5) Do teacher candidates' awareness levels regarding digital transformation in education vary by branch?

2. Material and Methods

2.1 Model

This research, which aims to examine the awareness levels of teacher candidates regarding digital transformation in terms of age, branch, grade level and gender variables, is structured according to the screening model. Kraemer (1991) defines screening studies as certain aspects of a certain universe in terms of relationships and considers them as studies that can generalize their findings to the entire universe. In this study, the awareness levels of teacher candidates regarding digital transformation were examined in terms of different variables. In order to generalize the results, the sample was tried to be kept wide. The relational screening method, one of the screening models, was used in the research. Tekbıyık (2014) defines relational screening studies as studies conducted to make statistical comparisons for the scores of each sample instead of affecting or controlling the variables. In this context, both the awareness levels of teacher candidates regarding digital transformation and the differentiation of these levels according to different variables were examined.

2.2 Sample

The sample of the study consists of teacher candidates working in the faculty of education of a state university. The easily accessible sampling model was used in the sample selection of the study. The easily accessible sampling method is also known as random or easily accessible sampling and aims to prevent loss of time, money and labor (Büyüköztürk *et al.*, 2014). The awareness of teacher candidates regarding digital transformation was addressed in the study. Considering that the awareness in question would not create a significant difference for any branch, all branches were included in the sample, and this method was chosen to make the data easier to collect. In this context, 287 teachers were included in the study. Bryman & Cramer (2001) state that the sample size should be at least five times the number of items and, if possible, ten times the number of items. Considering that the measurement tool used in the study had 50 items, the number of 287 is considered sufficient for the study. Descriptive statistics regarding the sample are given in Table 1.

Table 1: Descriptive statistics of the sample

Sex	
Female	210
Male	77
Total	**287**
Class Level	
1st Grade	119
2nd Grade	56
3rd Grade	49
4th Grade	63
Total	**287**
Age	
18-21	175

22-25	112
Total	**287**
Branch	
Primary school teaching	84
Mathematics teaching	49
Science teaching	56
Social studies teaching	42
Special education teaching	56
Total	**287**

When Table 1 is examined, it is seen that 210 of the participants are female (73.2%) and 77 are male (26.8%). When the class level is examined, the majority of the participants (119-41.5%) are first-year undergraduate students. While 175 (61%) of the participants are between the ages of 18-21, 112 (39%) are between the ages of 22-25. There are students from four different branches in the study, and the most participants are studying classroom teaching with 84 (29.3%).

2.3 Data Collection Tools

In the study, the awareness scale on digital transformation in education (DAS) developed by Yurdakal (2023) was used. The measurement tool was developed with 211 pre-service teachers studying at a faculty of education and is suitable for the study sample in question. Before the development of the measurement tool, a draft scale consisting of 82 items was presented to experts opinions and after the corrections, 20 items were removed from the measurement tool. A draft measurement tool with 62 items was created before the pilot application. 211 undergraduate students studying at a public university were included in the sample. As a result of the analyzes, the KMO value of the scale was 0.829; Cronbach's Alpha value was 0.957 for the overall scale; 0.954 for the first factor, 0.843 for the second factor and 0.793 for the third factor. Spearman-Brown correlation value was 0.921; Guttman Split-Half value was 0.917; Anova Tukey's Nonadditivity was found to be 0.000, Hotelling's T-Squared was found to be 0.000, and the Intraclass Correlation Coefficient value was found to be 0.000,. the scale consists of three dimensions. It is seen that the first dimension explains 33.5% of the variance; the second sub-dimension explains 7.4% of the variance of the scale, and the last factor explains 4.2%. The item loadings of the items in the first factor vary between 0.818 and 0.342; between 0.726 and 0.444 in the second factor, and between 0.764 and 0.457 in the last factor. The total variance value explained by the three factors is 45.19%. The scale consists of a total of 50 items; 33 items in the first dimension, 9 items in the second dimension and 8 items in the last dimension.

2.4 Data Collection

After formal arrangements regarding the measurement tool to be used within the scope of the research, it was duplicated and physically applied. 290 forms were applied in elective courses where different branches were educated. Since the application in question was voluntary, 3 students did not want to be included in the study. Before the

application, it was explained what the measurement tool measured. Then, they were asked to examine the measurement tool and if there were any unknown words or unclear points, question marks were tried to be eliminated. After it was stated that the collected data would not be shared with different stakeholders in any way, voluntary consent forms were distributed. While no time limit was imposed on filling out the scale, they were advised not to leave any questions blank.

2.5 Analysis of Data

The collected data were first given serial numbers. Then, all data were transferred to SPSS 22. Before the analysis of the data, the forms that were filled in incompletely or left blank were examined, but no blank forms were found. Then, the missing data were examined, and the extreme values that increased the range were determined by the Mahalanobis distance analysis, and these data were removed from the dataset. Although many distance measurement techniques are included in the literature, the Mahalanobis distance is used more in detecting multivariate outliers due to its many advantages (Venturini, 2015). The normality of the distribution was examined in order to choose the analysis method to be used in determining whether there was a difference between the variables. The normality of the distribution was examined in two stages, and in the first stage, the skewness and kurtosis coefficients of the groups were examined, and then the Kolmogorov-Smirnov test results. Tabachnick & Fidell (2013) state in their research that the kurtosis and skewness coefficients should be between -2 and +2 for the distribution to be normal. According to Morgan, Leech, Gloeckner & Barret (2004, p. 49), if the skewness coefficient is between -1 and +1, the distribution is normal. As a result of the analysis, the kurtosis value was found as: and the skewness value was found as: and the distribution is normal. After the data set was organized, descriptive statistical methods (Number, Percentage, Average) were used to evaluate the data. In the comparison of quantitative data (gender, grade level, branch and age), an independent groups t-test was used due to the normal distribution of the differences between the two groups, and in more than two groups, the One Way Anova test from parametric tests was used.

3. Results

Before the analysis of the data, the normality of the distribution was examined. According to Morgan, Leech, Gloeckner & Barret (2004), if the skewness coefficient is between -1 and +1, the distribution is normal. In this context, when the responses given by the participants to the measurement tool are taken into account, it is seen that the kurtosis value of the distribution is 0.528 and the skewness value is -0.469. In this context, it can be said that the group is normally distributed because the skewness and kurtosis values of the scores related to the sample are between -1 and +1.

3.1 Findings related to sub-problem 1

The first sub-problem of the research is "What is the awareness level of teacher candidates regarding digital transformation in education?" and the scale score averages, standard deviation and other statistical values for the sample are shown in Table 2.

Table 2: Awareness levels of the sample regarding digital transformation

Mean	Median	Mod	sd
122.99	125	127	12.63

The highest score that can be obtained from the scale determining the awareness levels of teacher candidates regarding digital transformation in education is 150, while the lowest score is 50. When the evaluation scale of the scores obtained is examined, it is determined that 50-83 is low awareness, 84-117 is medium awareness, and 118-150 is high awareness. The average score obtained by 287 participants from the measurement tool is 122.99 according to Table 2, and it can be said that the group is generally at a high awareness level.

3.2 Findings related to sub-problem 2

The second sub-problem of the research is "Do teacher candidates' awareness levels regarding digital transformation in education vary according to gender?" and the differentiation status of the mean scores according to the gender variable and the independent groups T-test results are shown in Table 3.

Table 3: Independent groups T-test results for gender variable

	Mean	t	df	Se.	Sig. (2-tailed)
Female	122.44	1.188	285	1.75	0.255
Male	124.45				

When Table 3 is examined, it is seen that the mean scale score of women is 122.44 and that of men is 124.45. As a result of the independent groups T test, $p = 0.255$, and the scale scores do not change according to gender. In this context, when the scores obtained from the digital awareness scale of teacher candidates are considered, this awareness does not change significantly according to gender.

3.3 Findings related to sub-problem 3

The third sub-problem of the research is "Do teacher candidates' awareness levels regarding digital transformation in education change according to age?" and the differences in average scores according to the age variable are shown in Table 4.

Table 4: Independent groups T-test results for age variable

	Mean	t	df	Se.	Sig. (2-tailed)
18-21	122.20	1.459	285	1.43	0.146
22-25	124.29				

When Table 4 is examined, it is seen that the scale score average of the 18-21 age group is 122.20, and the 22-25 age group is 124.29. As a result of the independent groups T test, p = 0.146, and the scale scores do not change according to the age variable. In this context, when the digital awareness of teacher candidates is considered, this awareness does not change significantly according to age.

3.4 Findings related to sub-problem 4

The fourth sub-problem of the research is "Do teacher candidates' awareness levels regarding digital transformation in education vary according to the grade level?" and the differentiation status of the average scores according to the grade level variable and the One Way Anova test results are shown in Table 5.

Table 5: One Way Anova test results for grade level variable

	N	Mean	ss	se	f	sig
1	119	121,1765	15,60022	1,43007	8.095	0.00
2	56	123,7500	7,92522	1,05905		
3	49	130,2857	8,77021	1,25289		
4	63	119,8448	9,74374	1,27942		
Total	**287**	**122,9965**	**12,63799**	**,75258**		

When Table 5 is examined, the scores of teacher candidates on the digital awareness scale differ according to the grade level. The Tukey technique, one of the post hoc techniques, was used to determine which grade levels this differentiation occurred between. The data regarding the Tukey analysis are shown in Table 6.

Table 6: Tukey analysis results for the grade level variable

Level	Level	Mean Difference	se	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-2,57353	1,97458	,562	-7,6771	2,5300
	3	-9,10924*	2,06827	,000	-14,4550	-3,7635
	4	1,33164	1,95129	,904	-3,7117	6,3750
2	1	2,57353	1,97458	,562	-2,5300	7,6771
	3	-6,53571*	2,38356	,033	-12,6963	-,3751
	4	3,90517	2,28280	,320	-1,9950	9,8054
3	1	9,10924*	2,06827	,000	3,7635	14,4550
	2	6,53571*	2,38356	,033	,3751	12,6963
	4	10,44089*	2,36430	,000	4,3300	16,5518
4	1	-1,33164	1,95129	,904	-6,3750	3,7117
	2	-3,90517	2,28280	,320	-9,8054	1,9950
	3	-10,44089*	2,36430	,000	-16,5518	-4,3300

When Table 6 is examined, it is seen that the digital awareness scores of the teacher candidates change according to the grade level. This difference is between the 1st and 3rd grades, the 3rd and 4th grades and the 2nd and 3rd grades. The digital awareness levels of the third-grade students were higher than all other grade levels. The average digital awareness score of the third-grade students is 130.28, which can be described as a high level of awareness. It can be said that the digital awareness of the participants is high in all other grade levels.

3.5 Findings related to sub-problem 5

The fifth sub-problem of the research is "Do teacher candidates' awareness levels regarding digital transformation in education vary according to the branch they study?" and the differentiation of the average scores according to the grade level variable is shown in Table 7.

Table 7: One Way Anova test results for the branch studied variable

	N	Mean	ss	se	f	sig
Primary School	79	124,7595	14,00844	1,57607	6.285	0.00
Science	61	122,8750	8,20435	1,09635		
Mathematic	49	125,5714	12,62933	1,80419		
History	42	126,1667	7,53825	1,16318		
Special Education	56	116,0000	14,86423	1,98632		
Total	**287**	**122,9965**	**12,63799**	**,75258**		

When Table 7 is examined, the digital awareness status of teacher candidates differs according to the branch they study. Tukey's Post hoc technique was used to determine which branches this differentiation is between. Data regarding Tukey analysis are shown in Table 8.

Table 8: Tukey analysis results regarding the branch studied

Branch	Branch	Mean Difference	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Primary School	Science	1,88449	,902	-3,9615	7,7305
	Mathematic	-,81193	,996	-6,8974	5,2735
	History	-1,40717	,974	-7,7980	4,9836
	Special Education	8,75949*	,000	2,9135	14,6055
Science	Primary School	-1,88449	,902	-7,7305	3,9615
	Mathematic	-2,69643	,790	-9,2428	3,8500
	History	-3,29167	,677	-10,1228	3,5395
	Special Education	6,87500*	,026	,5506	13,1994
Mathematic	Primary School	,81193	,996	-5,2735	6,8974
	Science	2,69643	,790	-3,8500	9,2428
	History	-,59524	,999	-7,6324	6,4419
	Special Education	9,57143*	,001	3,0250	16,1178
History	Primary School	1,40717	,974	-4,9836	7,7980
	Science	3,29167	,677	-3,5395	10,1228
	Mathematic	,59524	,999	-6,4419	7,6324

	Special Education	10,16667*	,001	3,3355	16,9978
Special Education	Primary School	-8,75949*	,000	-14,6055	-2,9135
	Science	-6,87500*	,026	-13,1994	-,5506
	Mathematic	-9,57143*	,001	-16,1178	-3,0250
	History	-10,16667*	,001	-16,9978	-3,3355

When Table 8 is examined, it is seen that the scores of the students studying special education teaching from the digital awareness scale are lower than those of other branches, and this creates a significant difference. The average digital awareness score of the participants studying special education teaching is 116, and it can be said that they have a medium level of awareness.

4. Discussion and Suggestions

4.1 Findings Regarding General Awareness Level

The lowest score that can be obtained from the digital awareness scale is 50, and the highest score is 150. The score range of 118–150 is defined as "high awareness". The average score of 287 teacher candidates was found to be 122.99; this shows that the participants generally have a high level of digital awareness. This result suggests that teacher education programs sufficiently include the subject of digital transformation and that the candidates are prepared for these processes. When the participants' ages are taken into account, it is seen that they belong to Generation Z. This situation can be said as the reason for the participants' high digital awareness. In fact, one of the main reasons for the high digital awareness levels of Generation Z is that this generation was born and raised in a period when technology was integrated into every aspect of life. Prensky (2001) defined this generation as "digital natives" and drew attention to the fact that they are in direct and constant interaction with digital tools and platforms.

The fact that digital communication tools, social media and mobile technologies have become an indispensable part of daily life has allowed Generation Z to naturally develop their digital literacy skills (Turner, 2015). In addition, the increasing digitalization of educational processes and the increase in distance education applications have further strengthened Generation Z's technology-based skills in accessing, producing and sharing information (Kirschner & De Bruyckere, 2017). In this context, the high digital awareness of teacher candidates can be attributed to both the advantages of the age and the course content of education faculties. However, not only exposure but also critical technology use tendencies play an important role in Generation Z's high digital awareness.

It is stated in the literature that this generation pays more attention to concepts such as information security, privacy and digital footprint in digital environments compared to previous generations (Seemiller & Grace, 2016). This shows that they have developed the skills to use digital technologies not only for consumption but also consciously, critically and creatively. As a result, Generation Z, who grew up in the center

of technological changes, has a profile that has both technical knowledge and critical evaluation skills in the field of digital awareness.

4.2 Findings Regarding Differentiation by Gender

The mean scores of female and male prospective teachers were 122.44 and 124.45, respectively, and no significant difference was observed in the independent groups t-test due to gender ($t(285)=1.188$; $p=0.255$). This finding shows that digital transformation awareness is a phenomenon independent of gender.

The fact that digital transformation awareness does not show a significant difference according to gender may be due to the fact that access to and use of digital technologies have been largely equalized in today's societies. In particular, the fact that technology integration has become standard for both female and male individuals in educational processes has brought opportunities for individuals to develop their digital competencies to a gender-independent level (UNESCO, 2019). Associating digital literacy with the individual's attitudes and skills towards using technology rather than their access to technology has reduced the effect of gender differences and created a more homogeneous digital awareness profile (Hatlevik *et al.*, 2015). In addition, the environmental and cultural conditions in which Generation Z teacher candidates were raised have enabled them to internalize technology as a part of daily life, regardless of gender.

Research shows that today's motivation to use digital tools is shaped in line with individual needs and professional development goals, and gender is no longer a determining factor in this process (Hatlevik *et al.*, 2015). Therefore, the fact that there is no significant difference in the digital transformation awareness levels of female and male teacher candidates reveals that digitalization has become more inclusive and egalitarian throughout society.

4.3 Findings Regarding Differentiation by Age

There was no significant difference between the age groups (18–21 and 22–25) ($t(285)=1.459$; $p=0.146$). This shows that candidates in different age groups have equal access to education-training activities regarding digital transformation during their education processes, and therefore, age is not an effective predictor of awareness level. The fact that there is no significant difference in the digital transformation awareness levels of teacher candidates based on age can be associated with the integration of digital technologies into the education system from an early age.

Since information and communication technologies have become a basic learning tool for all students in today's educational institutions, individuals in different age groups are exposed to similar digital experiences (Van Laar *et al.*, 2017). Especially young adults between the ages of 18–25 actively use technology in both their education and social lives and continuously improve their digital skills, which causes age differences not to have a significant effect on digital awareness.

4.4 Findings Regarding Differentiation According to Grade Level

ANOVA analysis revealed significant differences among four grade levels (1st, 2nd, 3rd, 4th grade) ($F=8.095$; $p<0.001$). Post hoc Tukey test showed that the awareness level of 3rd-grade candidates was higher than all other grades, and there were also significant differences between 1st and 3rd, 2nd and 3rd, and 3rd and 4th grades. The prominence of 3rd grade can be explained by the fact that the digital transformation course (GKD) is taken as an elective course throughout the faculty in the education given during this period. In addition, as the grade level increases, more courses on digital transformation are taken, which may have caused the 3rd grades to have higher awareness levels than the 2nd and 1st grades.

According to Tondeur *et al.* (2012), the requirement to use digital tools in internships and practical courses increases the practical experience of these candidates regarding digital transformation concepts. Similarly, it seems important for teacher candidates to have the opportunity to see and experience the pedagogical integration of technology into the classroom during their educational experiences (internship practices), to observe good examples and to be able to implement such practices themselves (Enochson & Rizza, 2009). Despite these situations, the level of awareness is lower in the fourth grades, especially in the internship courses, compared to the third grades. The fact that teacher candidates, in the fourth grades, focused on the AGS (Teacher Appointment Exam) exam may have affected their awareness levels.

4.5 Findings Regarding Differentiation by Branch

A significant difference was also observed as a result of the branch-based ANOVA ($F=6.285$; $p<0.001$), and it was found that the average scores of the candidates studying in the special education teaching department were significantly lower than those in all other departments. The Tukey test also revealed that special education showed lower awareness compared to the classroom teaching, science teaching, mathematics and social studies teaching departments. This situation may indicate that the educational content and practical internship opportunities regarding the use of digital tools and platforms in the field of special education are insufficient or that the candidates lack motivation for this field. The fact that the digital transformation awareness levels of the students in the special education teaching department are lower compared to other branches may be due to the fact that the integration of digital technology in this field has not yet become sufficiently systematic. In addition, the fact that the technologies used in special education (e.g. augmented communication devices, special software) require different technical knowledge and skills may have negatively affected the digital motivation and competence of the teacher candidates for these fields. In fact, the problems that may be experienced in the use of devices that are difficult to use and require technical skills can be generalized to all other technological tools. Therefore, the lower digital awareness levels of special education students can be explained by both the limited educational content and the inadequacy of application opportunities.

The research results revealed that in general, teacher candidates have a high level of awareness of digital transformation, but this awareness varies by grade year and branch. The fact that gender and age variables do not affect the programs indicates that the programs are designed with an egalitarian approach; however, grade level and branch differences indicate that both the curriculum content and application opportunities are not distributed homogeneously. Therefore, it can be recommended that digital literacy training be more widespread in the first and second grades in the early period, and that access to current technologies and professional development seminars be increased in the fourth grade. The lower awareness of special education department candidates indicates the lack of field-specific digital education materials. It is important to add more courses to the special education curriculum on the introduction and use of adaptable digital tools for student profiles, such as specific learning disabilities and autism spectrum disorders. The research sheds light on the strengths of teacher education programs in digital transformation and the areas that need to be improved. The program curriculum should be organized in a way that will gradually reinforce digital literacy skills at all grade levels; In addition, strengthening content support in departments that need to adapt to information technologies, such as special education, will contribute to the training of future teachers with full command of educational technologies.

In order to increase the digital awareness of teacher candidates, comprehensive and structured digital literacy courses should be added to the curriculum. In these courses, it should be demonstrated in practice how to use educational technologies such as interactive presentation tools, online collaboration platforms and learning management systems (LMS) for pedagogical purposes, beyond just basic computer and internet use. In addition, candidates should be encouraged to design and present their own content through workshops and hackathon-like projects; thus, they should have the opportunity to experience technology as a productive tool rather than just consuming it.

"Digital Application Centers" should be established in education faculties and schools to create environments where candidates can receive one-on-one support when they need it and test current hardware and software tools. In these centers, technology integration should be demonstrated through real classroom examples by both academics and guest experts from the sector with regular seminars, webinars and short certificate programs. In this way, candidates will be able to constantly keep their awareness of technological innovations up-to-date and continue their professional development after graduation.

One reason why the digital awareness levels of teacher candidates were high in this study may be that the emphasis on digital teaching methods has been given in recent years in education faculties. In addition, the widespread use of digital platforms in internships and educational practices has allowed candidates to be involved with technology in real educational environments. Another possible reason is that the 3rd-year students, who constitute the majority of the participants, took the "digital transformation in education" course conducted during this period and thus reached high motivation and skill levels. In addition, the widespread use of social media and online learning platforms

may have increased the awareness levels of candidates by allowing them to continue their personal learning experiences in the digital environment. In this context, the technology-centered nature of both educational programs and individual learning habits emerges as the main determinants of high awareness levels. In this context, the following suggestions can be made;

1) Strengthening digital education content for the field of special education,
2) Establishing digital application and experience centers in education faculties,
3) Designing branch-specific digital pedagogy training,
4) Increasing the use of digital tools in internships and practical training,
5) Expanding digital literacy training to all grade levels.

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