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The Journal of Limitless Education and Research, Volume 9, Issue 2

Sınırsız Eğitim ve Araştırma Dergisi, Cilt 9, Sayı 2

Dear Readers,

We are delighted to present you the July 2024 issue of the Journal of Limitless Education and Research.

The aim of our Journal, which has been continually published by the Limitless Education and Research Association (LERA) for 8 years since 2016, is to contribute scientifically to the field of education and research. To this end, theoretical and applied original studies are published for free and shared with readers at nationwide and worldwide.

The Limitless Journal of Education and Research is published in Turkish and English three times a year and indexed in EBSCO, Education Full Text (H. W. Wilson) Database Coverage List, which is accepted as a field index by the Higher Education Council (UAK in Turkish). Additionally, it is indexed in various national and international indexes such as ASOS, DRJI, ESJI, OAJI, ROAD, SIS, SOBİAD, Worldcat, and receives numerous citations. To the SOBİAD impact factor, our journal is in the top 90th among scientific journals in our country. Our initiatives and studies continue so as to let our journal be scanned in national and international indexes.

SEAD Journal, an internationally peer-reviewed journal, is published with scientific contributions of articles, research, and projects by academics, researchers, educators, and teachers from different countries. Our journal has been maintaining its publication for eight years without compromising its academic and scientific quality, delivering current and new studies to readers in the field.

In this issue of our journal, five scientific research and articles related to education are included. We would like to thank all the editors, authors, reviewers, and translators who contributed to the preparation and publication of this issue.

We extend our respect with the hope that our journal will contribute to scientists, researchers, educators, teachers, and students in the field.

LIMITLESS EDUCATION AND RESEARCH ASSOCIATION

The Journal of Limitless Education and Research, Volume 9, Issue 2

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Değerli Okuyucular,

Sizlere Dergimizin Temmuz 2024 sayısını sunmaktan büyük mutluluk duyuyoruz.

Sınırsız Eğitim ve Araştırma Derneği (SEAD) tarafından 2016 yılından bu yana 8 yıldır kesintisiz olarak yayınlanan Dergimizin amacı, eğitim ve araştırma alanına bilimsel yönden katkı sağlamaktır. Bu amaçla kuramsal ve uygulamalı özgün çalışmalar ücretsiz yayınlanmakta, ulusal ve uluslararası düzeydeki okuyucularla paylaşılmaktadır.

Sınırsız Eğitim ve Araştırma Dergisi (SEAD), yılda üç sayı olarak Türkçe ve İngilizce yayınlanmakta, ÜAK tarafından alan indeksi olarak kabul edilen EBSCO, Education Full Text (H. W. Wilson) Database Covarage List'te taranmaktadır. Ayrıca ASOS, DRJI, ESJI, OAJI, ROAD, SIS, SOBİAD, Worldcat gibi ulusal ve uluslararası çeşitli indekslerde taranmakta ve çok sayıda atıf almaktadır. SOBİAD etki faktörüne göre Dergimiz, ülkemizdeki bilimsel dergiler içinde ilk 90. sırada bulunmaktadır. Dergimizin ulusal ve uluslararası indekslerde taranabilmesi için girişimlerimiz ve çalışmalarımız devam etmektedir.

Sınırsız Eğitim ve Araştırma Dergisi (SEAD), uluslararası hakemli bir dergi olmakta, farklı ülkelerdeki akademisyen, bilim insanı, araştırmacı, eğitimci ve öğretmen yazarların makale, araştırma, proje gibi bilimsel katkı ve destekleriyle yayınlanmaktadır. Akademik ve bilimsel kalitesinden ödün vermeden sekiz yıldır yayın hayatını sürdürmekte, güncel ve yeni çalışmaları alandaki okuyuculara ulaştırmaktadır.

Dergimizin bu sayısında eğitimle ilgili beş bilimsel araştırma ve makaleye yer verilmiştir. Bu sayının hazırlanması ve yayınlanmasında emeği geçen bütün editör, yazar, hakem ve çevirmenlere teşekkür ediyoruz.

Dergimizin alandaki bilim insanı, araştırmacı, eğitimci, öğretmen ve öğrencilere katkılar getirmesi dileğiyle saygılar sunuyoruz.

SINIRSIZ EĞİTİM VE ARAŞTIRMA DERGİSİ

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Increasing Digital Awareness of Pre-service Teachers (An Experimental Research)

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Abstract: The skills expected from people have changed in the 21st century. These changing expectations have also influenced the concept of the ideal human profile. Creative thinking, critical thinking, and digital skills are among the skills expected from an ideal person during this period. This transformation is evident in many areas. There is no doubt that education systems that can adapt to digital transformation, especially in the field of education, will be the education systems of the future. Increasing teachers' awareness of digital transformation is essential in this process. Therefore, this study aimed to increase pre-service teachers' awareness of digital transformation. The research utilized a single-group pretest-posttest model from experimental designs. In this context, 30 randomly selected 3rd and 4th grade pre-service teachers studying in the Department of Primary Education were included in the sample. Within the scope of the research, the awareness scale for digital transformation in education developed by Yurdakal (2023b) was used. The scale, consisting of 50 items and 3 dimensions, has an alpha value of 0.957. Within the scope of the research, an 8-week curriculum was prepared. The curriculum was implemented for 8 weeks, with 4 weeks online and 4 weeks face-to-face. Pre-test and post-test data were collected before and after the implementation. During the process, diaries were distributed to the participants, and they were asked to write their thoughts about the entire process. The collected data were analyzed with SPSS 22, and dependent groups were analyzed with the T-test. The qualitative data obtained within the scope of the research were analyzed by content analysis, and codes were obtained and themes were identified by grouping the related codes. The themes were presented with supporting quotations. Looking at the results of the research, it was determined that the participants' post-test awareness of digital transformation (134.96) scores were significantly higher than the pre-test (99.56) scores. In this context, the training process on digital transformation awareness was successful.

Keywords: Digital learning, Digital awareness, Experimental research.

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1. Introduction

When we look at the historical process, the skills expected from people change in certain periods. In this process, all transformations have inevitably directly affected the phenomenon of education. These transformations also change the concept of the "ideal human being." Aristotle (1997) argues that the main factors in the formation of personality are appropriate education and social relations. In particular, the importance of social relations in the formation of the ideal person is emphasized. Along with communication, another skill that the ideal person should possess is the ability to think creatively. To cultivate human resources with high creative thinking abilities, it is essential to develop creative thinking in education (Juliantine, 2019). Especially with the Industry 4.0 revolution, the qualities expected from people have also changed. Industrial Revolution 4.0 has several important aspects, including information, technology, economy, social, and political dimensions (Prasetyo & Sutopo, 2018). The changes in the phenomenon of information have particularly influenced the skills that people should possess. Individuals who were once expected merely to acquire and relay information are now expected to internalize, transform, and present it with creative ideas.

Each age or period has its own definitions of the ideal human being. The changing ages and education processes can be summarized as follows: In the early ages, people's basic economic resources and needs were based on gathering. During these periods, education was generally centered on facts closely related to the economic structure, such as what can be eaten and where to collect certain products. As societies transitioned from gathering to agriculture, education focused on topics like which crops are produced in which seasons and which products grow in specific environments.

With the advent of the industrial revolution, people became integral parts of industrial society and thus of a mechanical structure; specialized vocational training became prominent. The industrial revolution promoted the idea that specialized education for each individual in their field of expertise was more beneficial than providing a common education for all. This period also saw an acceleration of the competitive mindset in education (Yurdakal, 2018a, p. 20). In today's era, often referred to as the information age, the primary economic structure is based on information and technology, which has consequently transformed the ideal human profile and educational processes. Historically, each society or culture had different expectations from its individuals. Factors contributing to these differences included social relations, religion, politics, or military contexts. However, with the globalization of the world in

the 21st century, all societies have inevitably begun to develop similar goals due to increased communication. This has led to the emergence of a universal "ideal human" rather than a society-specific "ideal human."

At its most extreme, globalization predicts the end of national economies and the emergence of a borderless world (Green, 2006). The process of globalization has also introduced the concept of "21st-century skills." Although it is a controversial issue, globalization has also had positive effects on education systems. Sellar and Lingard (2013) discuss this situation as follows: globalization has played an important role in both the reframing of education as an individual rather than a collective good and the emergence of a global policy space in education. Globalization has accelerated, especially in recent years, leading to a change in the ideal human profile. This change is a consequence of the perception that students need to acquire certain dispositions, qualities, and skills to participate in modern, globalized economies (Lauder et al., 2012). To adapt to this transformation, it is essential for schools to transform. Bull and Gilbert (2012) argue that the current model in schools does not meet the educational needs of current students and that there is a need to transition to a 21st-century learning model to meet the needs of 21st-century students. While it is important for individuals worldwide to access technology and gain digital awareness in accordance with the information age, according to Bennett et al. (2008), young people's use of and access to technology is not homogeneous.

In the age of technology or information, there is a need for individuals who can identify the information they are curious about or need, think about where they can find this information, put this idea into practice, analyze the information they need from the raw information they find, criticize the information, and synthesize all their findings by passing them through a truth filter to produce new information. Education is essential for raising individuals who fit this ideal human definition. To achieve this, education systems must be structured accordingly. An education system can be said to consist of four dimensions: students, teachers, curriculum, and management processes. Although these four phenomena are considered the cogs of a system, the teacher is at the center of all these cogs.

A country can develop and periodically update a curriculum that aims to raise ideal people. However, if the teacher fails to implement the curriculum effectively, all these efforts may lose their meaning. Moreover, for students to actively participate and be motivated, the teacher needs to create an environment in which the students embrace the school. In summary, teachers are at the center of this entire system, and for an ideal education system, teachers

need to be "ideal teachers." Harris and Sass (2009) argue that there are three types of teachers: those who are naturally gifted, those who practice the profession but lack the necessary professional skills, and those who are not suited to the role but practice the profession for various reasons. The ideal teacher falls into the first category. In everyday practice, these distinctions mark the beginning of many cognitive, affective, and behavioral differences among teachers that impact students' development and learning. The ideal teacher for the 21st century should motivate students and support independent learning (Carpenter & Tait, 2001); take responsibility for student achievement (Porter, 1989); have positive feelings towards their profession (McEwan, 2001); be student-oriented (Stronge et al., 2011); support creative thinking (Weinstein, 1989); avoid using physical or verbal violence (Yurdakal, 2018b); and have an empathetic perspective towards their students (Arnon & Reichel, 2009).

We have talked about the necessity of ideal education to reach the ideal person, but how should the ideal teacher be trained? This fundamental question has been discussed by developed countries for many years. An ideal teacher, especially in the information age, should know the skills needed and be open to transformation and change. There are some basic skills that the ideal teacher should know or acquire. In the context of the Republic of Turkey, it is important for a teacher to acquire 21st-century skills and the skills included in the Turkish Qualifications Framework. According to Darling-Hammond (2006), teachers need not only to be able to maintain order and provide students with useful information but also to be increasingly effective in enabling diverse groups of students to learn much more complex material. Whereas in previous decades they were expected to prepare only a small minority for ambitious intellectual work, they are now expected to prepare almost all students for higher-order thinking and performance skills once possessed by only a few. Many universities and colleges are reshaping their schools of education to emphasize content knowledge, use more educational technology, implement innovative educational programs, and create professional development schools for career changers and students who want to earn degrees online (Jan, 2017, p. 50). In this context, attention should be paid to educational technologies and technological-digital awareness in the process of training teachers suitable for the 21st century.

21st-century skills have been classified by various researchers and organizations. Given the continuous advancements in technology and science, it is inevitable that individuals' profiles will constantly evolve. It is important to note that, even the generalized notion of 21st-century skills may be subject to constant change. The most widely accepted classification of these skills comes from the Partnership for 21st Century Learning (P21) project, implemented across many

states in the USA. The project's primary mission is to harness the power and potential of 21st-century learning for every student, both in and out of school settings, nationwide and globally (BfK, 2023). These skills encompass Information Literacy, Information and Communication Technologies (ICT) Literacy, Media Literacy, Creativity and Innovation, Flexibility and Adaptability, Communication and Collaboration, Entrepreneurship and Self-Direction, Critical Thinking and Problem Solving, Social and Intercultural Skills, Productivity and Responsibility, as well as Leadership and Responsibility. In particular, when examining skills such as Information, Media, and Technology Skills, it becomes evident that they are closely aligned with the imperatives of digital transformation (Yurdakal, 2023a).

The concept of 21st-century skills has been developed based on frameworks such as the European Qualifications Framework, while the Turkish Qualifications Framework has been established to reflect these skills. They encompass: Communication in the mother tongue, Communication in foreign languages, Mathematical competence and basic competences in science/technology, Digital competence, Learning to learn, Social and citizenship competences, Initiative and entrepreneurship, and Cultural awareness and expression. Among these, digital competence stands out as particularly crucial. According to MoNE (2019, p. 5), this skill involves the safe and critical use of information and communication technologies for work, daily life, and communication. It includes basic skills like accessing, evaluating, storing, producing, presenting, and exchanging information using computers, as well as participating in and communicating through common networks on the internet. In this context, as outlined in the curriculum and supported by the regulations in the 2023 Education Vision (MoNE, 2018), it is essential for teachers to possess digital competence.

The success of reforms and improvement efforts in the education system, particularly in areas such as curriculum, materials, technology, and educational policies, hinges significantly on the professional competencies, perceptions, and commitment of teachers and school administrators. Enhancing the professional skills of educators and administrators is therefore crucial for delivering inclusive and high-quality education services that prioritize the well-being of the child. To address this priority, a new understanding, system, and model of professional development will be established, bolstered by supporting the professional growth of teachers and school administrators through graduate education.

Central to these efforts is the recognition of the necessity for teachers to possess digital competencies. Digital competence begins with acquiring digital awareness, as effective motivation and adaptation to the digital transformation process are not possible without it. Thus, determining the digital awareness of teachers or prospective teachers and fostering its development becomes essential for realizing the profile of the "ideal human" in today's context. This study aims to enhance the awareness of digital transformation among pre-service teachers. It seeks to address the following sub-problems:

1. What is the level of pre-service teachers' awareness of digital transformation before the implementation?

2. What is the level of pre-service teachers' awareness of digital transformation after the application?

3. Is there a significant difference between pre and post-test results of prospective teachers' awareness of digital transformation?

4. What are the opinions of pre-service teachers regarding the project?

2. Method

2.1. Model

In the study, one group pretest-posttest model was used as one of the experimental designs. In the single group pretest-posttest model, the effect of the experimental procedure is tested with a single group study. The measurements of the subjects regarding the dependent variable are obtained as pretest before the application and posttest afterwards using the same subjects and the same measurement tools (Büyüköztürk et al., 2013, p. 201). Information on this experimental design is shown in Table 1.

Table 1

Notation of the experimental process

	Pre-Test	Application	Post-Test
Experimental group	-Awareness scale on digital transformation in education -Diaries	-8-week curriculum on digital transformation -Virtual reality app -e-reader app -robotic coding application	-Awareness scale on digital transformation in education -Diaries

When Table 1 is examined, data were collected with the awareness scale on digital transformation in education developed by Yurdakal (2023b) and diaries distributed to the pre-service teachers before the application to the experimental group. After the 8-week

implementation period, the aforementioned data were collected again. The qualitative data collected from the diaries were not only collected during the pre- and post-test process, but they were asked to write a diary every week throughout the whole application. What is planned to be obtained from qualitative data is to determine how their thoughts changed in the process.

2.2. Sample

The study's sample consists of pre-service primary school teachers in their 3rd and 4th years at the Faculty of Education in a public university. Specifically, candidates from these years were selected as they were required to attain a certain level. An announcement about the study was made to all students in the US Primary Teaching Department, and initially, 22 students volunteered to participate. However, 10 students later withdrew voluntarily for various reasons. To replenish the sample, the remaining 12 students were interviewed to determine their eligibility and interest in joining the study, thereby increasing the number of participants. Hence, a snowball sampling model was employed. Snowball sampling is an easily accessible method used when it is challenging to reach subjects with specific characteristics. In this method, current study participants recruit future subjects from their acquaintances, continuing until data saturation (Burns & Grove, 1993). Despite the initial announcement, the desired number of participants could not be reached. Some candidates were unwilling to participate in the 8-week implementation process due to evening sessions scheduled after 5:00 PM, following their undergraduate courses. Nikolopoulou (2023) defines snowball sampling as a non-probability method where new units are recruited by existing units to form part of the sample. Through the snowball sampling approach, 32 pre-service teachers were initially contacted. Ultimately, the study was completed with 30 students, as two were absent during the process. Among the participants, 27 were female and three were male. All candidates had completed prerequisite courses in Technology Design and Computer 1-2.

2.3. *Data collection tools*

Data were collected in both qualitative and quantitative contexts. Quantitative data were collected with the awareness scale on digital transformation in education developed by Yurdakal (2023b). In the development of the awareness scale on digital transformation in education, the literature was first examined and then data were collected from 6 undergraduate students with a structured questionnaire on the subject. A draft measurement tool consisting of 82 items was created by collecting both the data from the literature and the data obtained from the qualitative study. Then, the draft scale with 62 items was finalized by taking expert opinions.

Especially considering that it can be filled in quickly, a 3-point Likert scale was deemed appropriate. Within the scope of the analysis, data were collected from 231 undergraduate students. The data were collected with Google Forms after obtaining the necessary permissions. The KMO value for the scale was 0.829, which was found to be sufficient for the sample. Before the analyses, extreme values that increased the range were determined and these forms were removed. After EFA, the scale consisting of 62 items was reduced to 50 items. After the validity analyses, firstly, two-half reliability analysis and then Cronbach's Alpha reliability method was used to determine internal consistency. Anova Tukey's Nonadditivity, Hotelling's T-Squared and Intraclass Correlation Coefficient analyzes were also performed to determine reliability. According to the analyzes, the final version of the Awareness Scale for Digital Transformation in Education consists of 50 items and 3 factors. There are 33 items in the first dimension, 9 items in the second dimension and 8 items in the last dimension. Considering the nature of the items it contains, the first factor was named concept-oriented transformation, while the second factor was named education-oriented transformation in accordance with the items it contains. The last sub-factor was named individual-oriented transformation since it included more individual-based items. Although the CFS consists of 47 positive items, there are 3 negative items in the measurement tool. The overall Cronbach's Alpha value was 0.957; 0.954 in the first factor, 0.843 in the second factor and 0.793 in the third factor. In its final form, the scale can be shown as a reliable and valid measurement tool. In the qualitative dimension of the study, data were collected through diaries. In this context, a diary was distributed to all participants and they were asked to write their thoughts on digital awareness and the weekly change of this awareness. In this context, different questions were given to the participants each week and they were asked to fill in the diaries by finding answers to these questions at the points where they got stuck. Examples of the questions given to the participants each week are as follows:

- What are the benefits of a teacher with increased digital awareness?
- In the 21st century, how can a teacher's digital awareness increase?
- What problems does a teacher with insufficient digital awareness experience in the education process?
- Did I gain digital awareness this week? What gains did I make?
- What kind of awareness did the training given this week create in me? What is the difference between the old and the new awareness?
- How did putting theoretical knowledge into practice contribute to my digital awareness?

• Did experiencing virtual reality glasses contribute to my digital awareness?

• How did my perception of robotic coding change after practicing with robotic coding sets?

2.4. *Data collection*

Within the scope of the research, the scale developed by Yurdakal (2023b) was first introduced to the participants. Although the scale consisting of 50 questions was intended to be applied online, it was physically applied since it was thought that due to the high number of questions, situations such as filling in without reading might arise. After the scale was introduced, the scale was explained and it was requested to pay attention not to leave any blank item. No time limit was set and since the concepts such as Alpha generation, Beta generation, Google classroom, metaverse and flipped classrooms were not fully known by the participants, these concepts were introduced before filling in the scale. In this context, pre-test data were collected and similar data collection process was repeated after 8 weeks of implementation. The pre-test data is 32 and the post-test data is 30. Since 2 participants abandoned the application in the 4th week of the process, the pre-test data of these two candidates were also excluded from the study. As a result, 30 pre-test and post-test data were collected face-to-face. Within the scope of the study, diaries were also distributed to the candidates. They were asked to write their thoughts about digitalization, technology, digital learning and digital transformation in the diaries from the first week to the last week of the study. The diaries were collected at the end of each implementation week. As a result of the 8-week implementation, it was determined that 26 candidates filled out the diaries and qualitative analysis was conducted on 26 diaries. During the 8-week implementation process, the program prepared to develop candidates' digital awareness is as follows;

Table 2

Information on the implementation process

	Theme	Index
Week 1	Project Introduction Pre-tests	Project Objective, Project Scope, Target Audience, Achievements, Events Content Tools and Equipment Teaching Models Date Ranges
Week 2	Introduction to Digital Transformation	What is Digital Transformation

		Information Age 21st Century Skills European Qualifications Framework Turkish Qualifications Framework 21st Century Teacher Competencies Ideal Human Profile in the Information Age The Infrastructure Problem of Education
Week 3	Basic Concepts in Digital Transformation-1	Digital Citizenship Digital Literacy Digital Information Search Digital Rights and Responsibilities Industry 4.0 Society 5.0 Internet of Things Cloud Systems Web1 Web2 Web3
Week 4	Basic Concepts in Digital Transformation-2	Digital Reading Digital Writing Digital Speech Internet of Things Artificial Intelligence The post Truth
Week 5	Implementation week	Robotic coding application Introduction and use of robotic coding sets
Week 6	Basic Concepts in Digital Transformation-3	Augmented Reality Virtual Reality Virtual reality glasses applications Metaverse E-Reader Applications
Week 7	Learning in Digital Transformation	Generations Problems Sociotelism Manipulation Information Pollution Phubbing Health Problems Internet Based Education Internet Supported Education Digital Games Digital Storytelling
Week 8	Education Systems in Digital Transformation Digital Security	Distance Education Emergency Distance Education Mooc Hybrid Education Flipped Education Web Tools Social Networks Blogs Blended Learning Mobile Learning Moodle Digital security

Week 9	Tools in Digital Transformation	Shifteo Voice Chip Technology Touch-Interactive Technology 3D Printer Smart Table Classroom Response Systems Pen Scanner Digital Clipboards (Padlet) Google Classrooms Evernote Chat Gpt4 Digital Measurement Tools (Kahoot) Prezi Pawtoon Google Forms Quizlet Onedrive Piktochart Grammarly Plickers Infogram Digital security
Week 10	Post-tests	Post-tests

2.5. *Data analysis*

Both qualitative and quantitative data were collected in this study, and each type underwent distinct analyses. Quantitative data were first imported into SPSS 23 to assess the normality of their distribution. Skewness and kurtosis coefficients were examined, followed by normality testing. Since the sample size was 30, the Shapiro-Wilk test was utilized as recommended (Büyüköztürk et al., 2012; Güriş & Astar, 2014, p. 183).

In the quantitative analysis, dependent samples t-tests were employed to compare pre- and post-test scores within the experimental group. While this test determines if there is a significant difference between two means, it does not quantify the size of this difference. Therefore, effect size (d) calculations were also conducted for the pre- and post-test comparisons to provide additional insights into the magnitude of the differences (Can, 2014, p. 140). In the qualitative dimension, analysis involved the examination of participant diaries. All diary data were transferred to a computer environment for systematic coding. An additional expert was consulted to independently code the data. In cases where discrepancies arose between codes, consensus was reached through discussion with the expert. The resulting codes were then organized into categories. Data from the diaries were tabulated and presented, complemented by participant quotations to illustrate key themes and findings.

3. Results

3.1. Findings related to the first sub-problem

The first sub-problem of the research is "What is the level of pre-service teachers' awareness of digital transformation before the application?" and the information about the participants' digital awareness levels before the application is given in Table 3.

Table 3

Participants' digital awareness pre-test results

N	Mean	Median	sd	Min.	Max.	se.
30	99.56	100.50	17.28	71	130	3.15

The highest score that can be obtained from the measurement tool is 150 and the lowest score is 50. 50-75 is very low awareness, 75-100 is low awareness, 100-125 is medium awareness and 125-150 is high awareness. Looking at the data, the participants' digital awareness scores were determined as 99.56 in the pre-test results before the application. In this context, although the awareness levels of the participants were close to medium level awareness, it was determined as low level awareness. According to the pre-test results, the participant with the highest score among the participants received 130 points and was characterized as having a high level of awareness, while the participant with the lowest score received 71 points and was classified as very low awareness.

3.2. Findings related to the second sub-problem

The second sub-problem of the research is "What is the level of pre-service teachers' awareness of digital transformation after the application?" and information about the participants' digital awareness levels after the application is given in Table 4.

Table 4

Participants' digital awareness post-test results

N	Mean	Median	sd	Min.	Max.	se.
30	134.96	135.50	7.43	119	146	1.35

The highest score that can be obtained from the measurement tool is 150 and the lowest score is 50. 50-75 is very low awareness, 75-100 is low awareness, 100-125 is medium awareness and 125-150 is high awareness. In this context, the mean digital awareness score of the participants was determined as 134.96 in the post-test results after 9 weeks of implementation. In this context, the awareness levels of the participants were determined as high level. In this case, the awareness of the participants increased from low level to high level after the

application. According to the post-test results, the highest score among the participants was 146 and the lowest score was 119. In this context, the participant with the lowest score can be characterized as having a medium level of awareness, although very close to a high level of awareness.

3.3. Findings related to the third sub-problem

Within the scope of the third sub-problem of the research, the digital awareness levels of the sample of 30 people were compared as pre-test and post-test. Information regarding the comparison in question is given in Table 5.

Table 5

Dependent groups t-test results regarding the participants' pre- and post-test results

	Mean	t	df	Se.	Sig. (2-tailed)
Pre-test	99.56	135.50	7.43	3.80	0.00
Post-test	134.96				

When Table 5 is examined, the average digital awareness score of the participants before the application was 99.56, while the average score after the application was found to be 134.96. Considering the p score, there is a significant difference between the pre- and post-tests. This difference is also in favor of posttest scores. As a result, the 9-week digital awareness training was successful and the participants' low awareness levels turned into high levels of awareness after the application.

3.4. Findings regarding the fourth sub-problem

When the diaries were examined, it was seen that the expectations of the participants were generally low at the beginning of the process. Especially considering that the participants are generation Z and are in touch with technology, they predicted that they knew all the contents or tools and equipment to be used in the application process. As an example, we can put forward the opinion of participant number 4: “I think within the scope of the digital transformation project, things that I already know will be explained. Maybe I'll learn some new information.” However, when the diaries are examined in general towards the end of the application, it is observed that these views change. Participant 11 expressed the following opinion on this subject: “At the end of this process, which I thought would not contribute much to me at the beginning of the project, I realized that I actually did not know anything about technology and digital issues. "In particular, robotic coding and virtual reality applications were something I experienced for the first time."

Looking at the diaries of the participants, they were especially happy to learn new concepts. Although it seems that they actually heard concepts such as phubing, post-truth, sociotelism and gaslighting, but did not know their meanings and contents, their internalization of these concepts at the end of the application can be considered an important development. Participant 2 stated the following opinion on the subject: “During the application process, it was important for me to learn the concepts that I had heard but did not know the meaning of or misunderstood. I've heard of the concepts of phubing and gaslighting, but it turns out I don't know them. “In this sense, it was very useful.”

In the meeting held with the participants before the application, it was stated that practical applications would be held for 2 weeks and that robotic coding sets, e-readers and virtual reality glasses would be applied during this period. In the diaries before the application, it is seen that there was a great expectation especially for the virtual reality glasses, but after use, it was not a tool as expected. Regarding the subject, participant 22 expresses the following opinion: “We used e-readers and reality glasses this week. I envisaged both materials while they were explained in previous lessons. I was not impressed at all when I used it in class. Frankly, these vehicles did not meet my expectations.”

Participants were particularly interested in the topics of “generations” and “digital literacy”. Although they had heard about the subject of generations in different media before, learning the content and characteristics of generations satisfied the participants. Participant 7 makes the following statement about the subject: "I thought I knew the generations before the course, but I learned things beyond what I knew." Similarly, participant 19 puts forward the following opinion: “I thought there were only generations Z and X. And these seemed ridiculous to me. However, considering what I learned in class, I saw that it was very logical. Also, there were many generations, it was very useful for me.”

The fact that the participants are especially Generation Z can be considered as being well-equipped with technology. However, it seems that they do not actually have in-depth knowledge. It has been revealed that the participants have many deficiencies, especially in searching for information on Google, which is considered the simplest. Participant 14 said, "...another thing that surprised me in this course was that I realized I wasn't searching correctly on Google." He made a statement as follows. In addition, it was observed that many features offered by Google were unknown to the participants. Participant 27, who stated in the diaries at the beginning of the application that he knew everything about searching for information on

Google or the internet, said at the end of the application, "It turned out that I did not know how to use Google." In particular, I had never heard of Google trends and Google alert features. "It was very useful," he said.

The participants' thoughts before the application have changed a lot, especially regarding artificial intelligence. Considering artificial intelligence as a tool that only does homework has been replaced by serious considerations. Participant 1 said, "When the subject of artificial intelligence was first brought up, I thought what a ridiculous thing it was." As the weeks went by and I thought about it, I started to find artificial intelligence logical and even afraid of it." Similarly, participant 19 said, "Our teacher talked about the deep learning feature of artificial intelligence. We talked a little about science fiction in class. Things that seemed ridiculous and false started to scare me with the discussion environment. "I also learned that artificial intelligence can help me in many areas, not just for homework." He makes an explanation as follows.

During the application process, activities were carried out with 2 different robotic coding sets. At the beginning of the application, the participants claimed that they did not know robotic coding and that they would have difficulty in these experiences. However, when the opinions are examined after the application, it can be said that their negative thoughts turned into positive ones. Participant 9 said, "We practiced robotic coding this week. I thought I couldn't do this before. I had visualized it and was afraid. In the course, I saw that robotic coding is not a big deal and it is not something that cannot be done. "Experiencing it firsthand was very meaningful to me," he says. Participant 24 said, "We are in robotic coding week. I thought I couldn't do it. But the lesson was very productive. I saw that robotic coding is not as difficult as it seems. I saw how useful this application, made with simple machines, was and how it addressed many gains. "I will use these in my professional life as well."

During the implementation process, models such as MOOC, distance education, hybrid education, emergency distance education and flipped education were shown. Some weeks of the application were made according to these models. When the opinions of the participants are examined, it is especially important that they say that they have heard of these models but they think they are wrong. It is important that the application eliminates this deficiency. Regarding the subject, participant 13 said, "We saw the concepts of distance education and emergency distance education in the course. What we actually did during the pandemic period

was not distance education. I found this to be a misconception. He makes a statement saying, "What I knew was wrong."

4. Discussion and Conclusion

In today's world, often referred to as the information age or digital age, the profile of individuals who simply memorize and regurgitate information upon request has diminished in significance. Instead, there is increasing importance placed on individuals who can identify their needs, determine where to access relevant information, and obtain it from reliable sources. Beyond mere retrieval, ideal individuals today are those who generate new knowledge through creative thinking, filtering information critically. The digital age has seen widespread adoption of phenomena such as artificial intelligence, the Internet of Things, and the metaverse, making digital literacy a crucial skill. Accordingly, the Ministry of National Education has developed the Turkish Competences Framework, aligning it with the European Competencies Framework, and integrating digital competence as a core component.

To equip Generation Z and subsequent Alpha generations with digital competence, it is crucial for them to first acquire digital awareness. This study investigated the digital awareness levels of teacher candidates enrolled at a public university's Faculty of Education, aiming to enhance their awareness through an 8-week digital awareness program. The program covered essential topics for the information age, including artificial intelligence, the metaverse, augmented and virtual reality, robotic coding, and the Internet of Things. In the experimental phase, participants received both theoretical knowledge and engaged in practical applications such as robotic coding, augmented reality, and artificial intelligence. The "Awareness Scale on Digital Transformation in Education," developed by the researcher, was used to measure participants' digital awareness levels at the beginning and end of the 8-week period. The results indicated that both theoretical instruction and practical training were successful, resulting in a significant increase in participants' digital awareness.

In their study, Lafcı Tor et al. (2022) assessed the digital literacy levels of teacher candidates and investigated whether these levels varied by gender, program, housing, and family income. The research concluded that prospective teachers generally exhibit low digital literacy levels, suggesting that instructional technologies should be integrated into various courses rather than remaining isolated as standalone subjects in teacher training programs. This approach aims to enhance the digital literacy skills of future educators. The study's premise underscores the insufficient digital competencies among teacher candidates, highlighting the

need for further detailed research on digital competence, digital awareness, and digital literacy. Achieving adequate digital competencies and awareness among Generation Alpha and subsequent generations necessitates educators themselves possessing a certain level of digital awareness. Digital awareness empowers teachers and students to actively contribute and shape their identities on local, national, and global platforms by facilitating the exchange of shared knowledge, perspectives, ideas, perceptions, and experiences through digital tools (Combi, 2016). Therefore, recommendations include implementing activities aimed at enhancing digital awareness or incorporating specialized courses into education curricula, particularly within faculties of education.

Various studies present differing findings regarding digital literacy levels among teacher candidates. Kozan and Bulut Özek (2019) examined the digital literacy levels and cyberbullying sensitivities of education faculty students, finding that teacher candidates generally exhibited high digital literacy. Similarly, Karakuş (2022) reported high levels of digital awareness, proficiency, and fluency among teacher candidates in their study. Aksoğan and Özek (2020) also found that technological awareness levels among teacher candidates were high. Additionally, Usta et al. (2007) investigated the attitudes of teacher candidates toward internet use, revealing that students who owned computers had more positive attitudes toward internet use compared to those without personal computers. They also noted that students who started using computers during their primary school years showed more positive attitudes than those introduced to computers at university. Similarly, Göldağ (2021) found that students who owned computers demonstrated higher levels of digital literacy and awareness of digital data security. Moreover, increased usage of digital devices correlated with higher levels of digital literacy and awareness. These findings underscore the importance of utilizing tools such as VR glasses, robotic coding, and artificial intelligence programs to enhance the digital awareness of teacher candidates, particularly at the undergraduate level.

Karagül (2020) concluded in his research that teacher candidates lack sufficient knowledge and skills in technology use. Similarly, Gündoğan (2017) found in his study with teachers that their technology competencies ranged from slightly adequate to sufficient. Göldağ (2021) investigated the digital literacy levels of university students and their awareness of digital data security, determining that students' digital literacy levels were moderate. Çebi and Reisoğlu (2020), in their research with teacher candidates, also reported that candidates' digital competencies were at a moderate level. These findings align with the results of this study and other literature suggesting similar conclusions. Specifically, the pre-test results of participants in

this study indicated a digital awareness score of 99.56, categorizing their awareness levels as moderately low despite nearing a moderate level.

The Covid-19 pandemic significantly impacted young individuals, including students and teacher candidates, who increasingly utilized digital environments for education during lockdowns. Pokhrel and Chhetri (2021) highlighted digital learning as a crucial solution during the pandemic, despite the challenges faced by students and educators. Gopika and Rekha (2023) observed a significant rise in students' engagement with digital learning after COVID-19 emerged, noting increased satisfaction with digital learning opportunities. However, their study also indicated a decrease in student motivation and awareness post-pandemic. This study similarly observed low levels of awareness among teacher candidates in the post-COVID-19 period, as evidenced by their pre-test scores.

In their study, Mardiah et al. (2021) examined high school seniors' awareness of digital literacy and underscored the importance of technological tools in enhancing students' digital awareness. They recommended digital literacy tools such as access, management, evaluation, integration, and programming for fostering digital literacy awareness among students. Khanal et al. (2020) investigated the digital awareness of mathematics teachers in Nepal, finding that a majority of participants possess digital devices and have high levels of digital awareness. While these studies and the present research yield differing results, it is noteworthy that a significant portion of the sample in this study regularly uses digital devices. Considering these findings, several recommendations can be made:

• Current studies on digital awareness predominantly involve screening, suggesting a need for more experimental studies aimed at developing awareness in this area.

• The curriculum of teacher candidates at faculties of education, particularly those preparing to teach Generation Z and Generation Alpha, should be revised to integrate digital transformation. Although digital transformation topics are currently covered in undergraduate courses, adding a mandatory course specifically dedicated to this subject is essential.

• Research should focus on identifying factors influencing digital awareness or technological literacy. Understanding these factors will facilitate more effective awareness-raising efforts.

CONFLICT OF INTEREST STATEMENT

The author declares that there is no conflict of interest in this study.

RESEARCH AND PUBLICATION ETHICS STATEMENT

This research was conducted with the approval of Pamukkale University Social and Human Sciences Research and Publication Ethics Board dated 11.03.2024 and numbered E-93803232-622.02-506654.

AUTHOR LIABILITY STATEMENT

The author declares that he has done every step of this work himself.

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