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Assessment of Digital Competencies of Teacher Educators with the DigCompEdu Framework

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Abstract

This study aims to examine the digital competence levels of teacher educators, one of the essential stakeholders in the field of education, and their experiences of using digital technology in education processes based on the Digital Competencies for Educators (DigCompEdu) Framework. The study used an explanatory design, one of the mixed-method research designs. One hundred thirteen teacher educators working in a major state university in Türkiye participated in the study. According to the findings, teacher educators mostly use Learning Management Systems (LMS) and digital presentations, videos, and digital assessment tools. They have high competence in using digital technologies and see their work environment as sufficient in terms of technical infrastructure. Teacher educators' digital competencies and competencies for the leading competence areas are at the "Integrative - B1" level. Teacher educators at these levels are curious and open to innovations. However, educators should be supported in gaining higher-level competencies, such as using digital technologies, by supporting them with pedagogical approaches and providing guidance to other educators. In the interviews with teacher educators, the necessity of professional development programs in developing digital competencies for teacher educators and pre-service teachers was mentioned. In this context, obtained results and implications were discussed in detail.

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Introduction

In the 21st century, the Internet and digital technologies have become integral to daily life. The role of education processes at all levels is significant in helping individuals reach the potential to achieve and maintain these gains in social life. In this context, the primary mission of higher education institutions that prepare individuals for professional life is not only to support their current learning processes but also to enable them to gain digital competencies that will contribute to their growth as lifelong learners (Daniela et al., 2018; Rafique, 2014; Redecker, 2017).

Educators are essential for higher education institutions to reach their institutional goals. Therefore, educators must undertake laborious tasks for both themselves and learners to adapt to the developments efficiently. They must also follow new teaching, learning, and research trends more than learners and keep themselves up-to-date (Instefjord & Munthe, 2016; Rafique, 2014). Moreover, in the research on digital educator competencies, it is emphasized that educators should constantly change and develop in parallel with technological and social developments (Rychen & Salganik, 2003; Virtič & Pšunder, 2010), gain digital competencies focused on integrating technological, pedagogical and field-related knowledge by the cooperation with the learner (Ghomi & Redecker, 2019), and help the development of learners' digital competencies by using the pedagogical capacities of technologies (Fullan & Langworthy, 2014). However, supporting the development of digital competencies of educators has gained even more importance with the COVID-19 pandemic process. In this process, the unexpected spread of distance education (Emergency Remote Teaching [ERT]) brought the necessity of supporting the qualifications of educators in terms of distance teaching. In order to increase the quality of education offered in distance education environments, educators need to adapt to these new learning environments. For educators to adapt to the differences arising from the nature of online environments and have a qualified teaching process, they are expected to have competencies for the effective use of several technologies in learning processes beyond their competencies in traditional education processes (Arah, 2012; Baran et al., 2013; Varvel, 2007).

Digital Competencies for Educators (DigCompEdu) Framework

Many frameworks have been developed for the identification of digital competencies. These frameworks provide general descriptions of digital competencies but must be more specific to educators. Some of the relevant frameworks are specific to students and educators at certain levels, while others cover all adults or a particular segment of society (Calvani et al., 2008; Ferrari, 2012; International Society for Technology in Education [ISTE], 2017; Janssen et al., 2013; Ottestad et al., 2014). For this reason, the current research is based on the Digital Competencies for Educators (DigCompEdu) Framework, which is specific to educators.

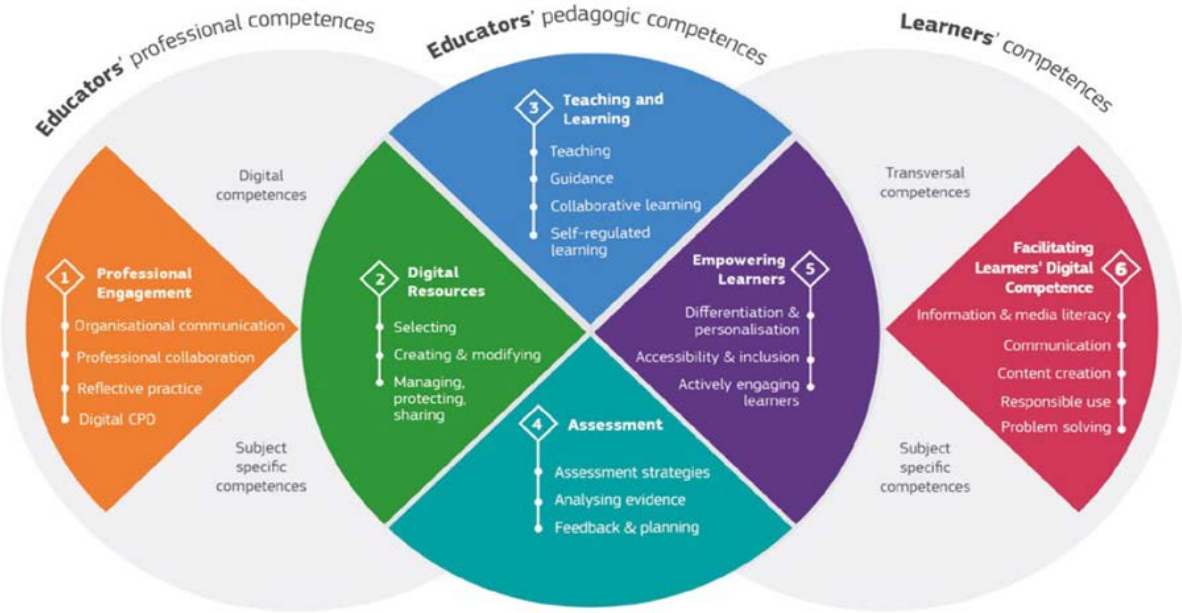
The "European Union Framework Study for Digital Competencies of Educators" was carried out by the European Union Commission in order to determine the digital competencies of teachers and educators and to develop them accordingly. As a result of the study, the DigCompEdu Framework" was created, reported, and presented to open access (Redecker, 2017). Educators are not only role models of learning processes but also facilitators. Therefore, as professionals devoted to teaching, they need to have digital competencies specific to educators and general digital competencies related to their own lives and work processes to

use digital technologies effectively in their teaching processes. The DigCompEdu framework aims to identify and define these digital competencies specific to educators (Redecker, 2017; Toker et al., 2021). The DigCompEdu framework, with its solid theoretical structure, guides policy-making studies at all educational levels and allows individuals or institutions to determine their current situation and needs. In addition, it ensures that digital educator qualifications can be evaluated in a common language and a standard structure at the international level. For this reason, in this research, the relevant framework has been taken as a basis to examine educators' digital competencies.

DigCompEdu consists of six main digital competence areas and 22 sub-competencies structured within the scope of professional and pedagogical competencies of educators and learners competencies (Redecker, 2017). The DigCompEdu framework is presented in Figure 1.

Figure 1

DigCompEdu Framework (Redecker, 2017, p15.)



It aims to help educators understand their strengths and weaknesses by defining different stages/levels of development for each competence covered in the DigCompEdu framework. In this direction, a leveled (A1, A2, B1, B2, C1, C2) evaluation model is used. At these levels, A1 represents the lowest level, and C2 represents the highest level. According to the DigCompEdu framework, *educators at the A1 (Beginner) level;* are individuals whose digital competencies must be developed. *Educators at the A2 (Explorer) level;* are aware of the potential of digital technologies and can use these technologies in some areas. However, they tend to research and develop themselves to use digital technologies in conjunction with pedagogical and professional practices. B1 (Integrative) level educators; are individuals who can integrate digital technologies with a significant part of the applications they perform per various contexts and purposes. They are willing to use digital technologies in innovative and different ways in order to improve themselves professionally. *Educators at the B2 (Expert) level;* use digital technologies securely and innovatively to enhance their professional activities. They can consciously choose the digital technologies to be used in certain situations and evaluate the

benefits and drawbacks of different digital strategies. They are curious and open to innovations. *Educators at the C1 (Leader) level;* have a consistent and comprehensive approach to digital technology in developing pedagogical and professional practices. They can continuously improve their educational practices with appropriate technologies and strategies. By constantly following new developments, they help other lecturers realize the potential of digital technologies to improve education. *Educators at the C2 (Pioneer) level* question the adequacy of innovative digital and pedagogical practices that they lead. They focus on constantly improving their educational processes by evaluating these applications from different perspectives. They try innovative and complex digital technologies and develop new pedagogical approaches. They play a pioneering role in innovation and a guiding role for other educators (Redecker, 2017).

Teacher Educators and Digital Competencies

Teacher educators' perspectives on technology are expected to be different from other educators. Because the target audience is pre-service teachers, how each technology can be utilized effectively in educational processes should be modeled to guide future use processes (Krumsvik, 2011; Røkenes & Krumsvik, 2014). In other words, it is necessary to use digital technologies with effective pedagogical practices and be aware of the impact of these technologies on learning strategies and students' acquisition of digital skills (Instefjord, 2014; Rana & Rana, 2020).

In the studies on teacher educators, it is emphasized that educators use digital technologies at an elementary and theoretical level (Blayone et al., 2018; Jwaifell et al., 2019; Røkenes & Krumsvik, 2016), and they also do not carry out pedagogical practices at a level that can be a model by integrating them into the education process (Amhag et al., 2019; Ranieri & Bruni, 2018). On the other hand, pre-service teachers show a positive attitude toward using digital technologies in education but consider themselves less experienced users (Štemberger & Konrad, 2021). In addition, these negativities may directly affect how pre-service teachers use digital technologies in their teaching processes (Agyei & Voogt, 2011). Another study shows that pre-service teachers' digital skills increase with years of training at universities (García-Vandewalle et al., 2021). At this point, of course, the frequency of digital technologies in educational processes is essential, as well as the individual characteristics of pre-service teachers, such as their attitudes toward technology (Cattaneo et al., 2022; Lucas et al., 2021). In addition, teacher educators' characteristics, digital competencies, and attitudes toward digital technologies also seriously affect the learning processes of pre-service teachers (Núñez-Canal et al., 2022). For this reason, it is crucial to examine the digital competencies of teacher educators who train future teachers and to determine the necessary policies in line with the results obtained (Cabero-Almenara et al., 2020; Jwaifell et al., 2019; Littlejohn et al., 2012; Virtič & Pšunder, 2010).

Purpose and Significance of the Study

The pandemic has also shown that digital transformation in education should be focused on continuing education effectively without interruption under all circumstances. Educators are the most critical stakeholders of digital transformation in education. During the pandemic, educators have gained the necessary experience using digital technologies in education with ERT. One of the issues that should be emphasized is whether educators will use the knowledge,

skills, and experiences they have gained from this process when they switch to formal or blended learning approaches. Determining the use of digital technologies and digital competence levels of teacher educators who train future teachers is vital in creating future education policies. This study examines teacher educators' digital competence levels and their experiences of using digital technology in education processes based on the DigCompEdu Framework. For this purpose, the following research questions will be answered:

(1) What is the level of use of digital technologies by teacher educators?

(2) What are the digital competence levels of teacher educators?

(3) What are teacher educators' actions and expressions in digital competence areas?

Method

In this study, an explanatory design, one of the mixed-method research designs, was used to determine the digital competence levels of teacher educators. The explanatory design consists of two stages. First, quantitative data is collected and analyzed. Then, qualitative data is used to explain better the quantitative data obtained (Fraenkel et al., 2012; McMillan & Schumacher, 2006). In this study, quantitative data was collected through a self-assessment tool to determine the digital competence levels of teacher educators. Then interviews were conducted with the selected educators. Thus, the actions and expressions of educators on digital competence areas were tried to be determined and explained.

Participants

One hundred thirteen teacher educators working in the education faculty of a major state university in Türkiye participated in the study. Participants were involved in the study voluntarily, and the necessary ethical permissions were obtained from the university's ethics committee. Demographic information of teacher educators participating in the study is presented in Table 1.

Table 1

Demographic Information of the Participants

	n	*%*		*n*	*%*
Gender			*Department*		
Female	33	29.20	Math and Science	31	27.40
Male	80	70.80	Turkish and Social Science	25	22.10
Age			Foreign Languages	13	11.50
25-39 years	24	21.20	Educational Sciences	14	12.40
40-49 years	48	42.50	Computer Education	7	6.20
50 years and above	41	36.30	Fine Arts	6	5.30
Years of teaching experience			Physical Education	5	4.40
1-9 years	21	18.50	Special Education	1	.90
10-19 years	34	30.10	*Digital technology usage before the pandemic*		
20 years and above	58	51.40	%0-25	43	38.10
Academic title			%26-50	38	33.60
Professor	36	31.90	%50 and above	32	28.30
Associate professor	36	31.90			
Assistant professor	33	29.20			
Lecturer	8	7.10			

In the quantitative phase of the study, data were collected from 113 teacher educators via an online survey. Afterward, semi-structured interviews were conducted with six selected participants. Attention was paid to these participants being in different departments and digital competence levels. The information of the teacher educators interviewed is presented in Table 2 in detail.

Table 2

Demographic Information of the Teacher Educators Interviewed

	Gender	*Department*	*Academic title*	*Digital Competence Level*
Participant 1	Male	Chemistry	Professor	A2
Participant 2	Male	Science	Professor	A2
Participant 3	Male	English language	Professor	A2
Participant 4	Male	Math	Associate professor	B1
Participant 5	Female	Social sciences	Assistant professor	B1
Participant 6	Female	Elementary	Assistant professor	B2

Teacher educators participating in the study conducted their lessons with the ERT during the pandemic process. In this process, they conducted their lessons through the Learning Management System (LMS), which uses the Moodle infrastructure and is provided free of charge by the university. Educators conducted synchronous virtual classrooms on the BigBlue Button platform. Asynchronously, they shared their course resources via LMS and organized asynchronous activities such as homework and forums. Many teacher educators without previous online teaching experience had to use various digital devices and platforms in this process. In this process, the relevant units of the university provided technological and pedagogical support to the instructors.

Data Collection Tools

This study used the self-assessment tool (DigCompEdu Check-In tool), which is based on the European DigCompEdu, (Caena & Redecker, 2019; Redecker, 2017). The Turkish-adapted version of the assessment tool in the study was used to make the items suitable for higher education (Toker et al., 2021). The tool includes 13 questions to reveal the educators' demographic information, their use of digital technologies, and the infrastructure and support activities related to using digital technology in their institution. Moreover, the tool includes 5-point Likert-type questions (1: Strongly Disagree…5: Strongly Agree) and 22 multiple-choice questions with five answer options for which points ranging from 0 to 4 are scored, for mean scores of 4-point Likert questions, value intervals indicate that 0-0.79 is very low, 0.80-1.59, is low, 1.60-2.39 medium, 2.40-3.19 high, 3.20-4.00 very high levels. DigCompEdu sets out 22 competencies organized in six areas. The competencies are explained at six levels competence (A1, A2, B1, B2, C1, C2). The total score ranging from 0 to 88 points is mapped onto the six competence levels of the framework. Digital competence levels according to the total score from six dimensions are given in Table 3. In this study, Cronbach's alpha reliability score of the assessment tool was calculated as .953.

Table 3

Digital Competence Categories by Dimensions

Competence Level	*Areas 1 and 3*	*Areas 2, 4 and 5*	*Area 6*	*Total*
Beginner (A1)	4 points	3 points	5-6 points	0-19
Explorer (A2)	5-7 points	4-5 points	7-8 points	20-33
Integrative (B1)	8-10 points	6-7 points	9-12 points	34-49
Expert (B2)	11-13 points	8-9 points	13-16 points	50-65
Leader (C1)	14-15 points	10-11 points	17-19 points	66-80
Pioneer (C2)	16 points	12 points	20 points	Above 80

For the qualitative part of the study, the researchers prepared a semi-structured interview form consisting of 6 questions to explain the quantitative data based on the dimensions of the DigCompEdu framework. In this form, there were questions to explain the actions and expressions for the digital competence levels of the educators in 6 competence areas. In this direction, questions were structured in the interview process, taking into account the department and digital competence level of the interviewer. For example, an interviewer, who considers himself at the B1 level regarding digital resource use, was asked questions about his practices and the opportunities and obstacles to reaching the high level.

Data Analysis

Quantitative data from the study were analyzed with descriptive statistical methods (percentage, frequency, graph, mean, etc.). SPSS 21 and Microsoft Power BI software were used to analyze the data. The qualitative data were obtained from the semi-structured interviews. The interviews were conducted by two researchers of the study and transcribed. Content analysis was carried out by importing the transcripts to NVivo 12. As a result of content analysis, various codes, categories, and themes were created. To ensure inter-coder reliability, one researcher coded the data, and the other coded it. The coded data were performed for reliability analysis, and Kappa was found to be 0.94, indicating a high degree of consistency. Finally, a consensus was reached on the coding of all data. In the findings section, direct quotations from the participants were also presented. While presenting direct quotations, participants were coded as P1, P2… according to the information in Table 2.

Results

The findings regarding the digital competence levels of teacher educators and their experience of using digital technology in education processes are presented in line with the research questions.

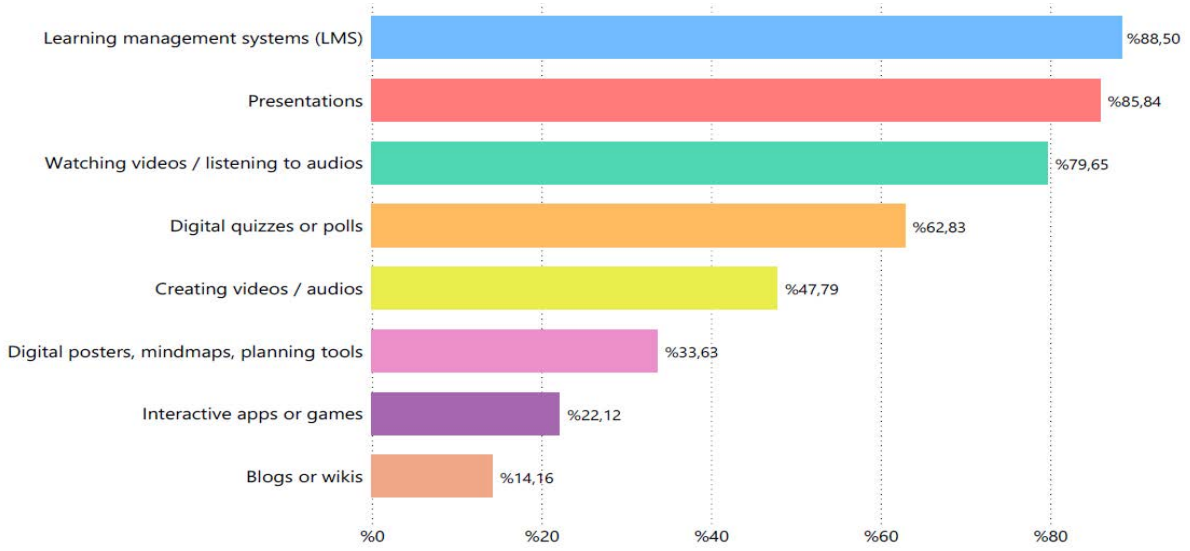
Teacher Educators' Digital Technology Backgrounds

The teachers` opinions and use of digital technology in their teaching and educational background were examined.

The data obtained on teacher educators' usage percentage of specific digital tools in the teaching and learning processes were analyzed and presented in Figure 2.

Figure 2

Digital Tools Usage Percentage



According to Figure 2, teacher educators use LMS and presentations the most and interactive apps/games and blogs/wikis the least.

Within the scope of the study, data on the usage of digital technologies in terms of private usage and work environment by teacher educators were analyzed and presented in Table 4.

Table 4

Digital Technology Usage and Work Environment

	M	*SD*
Private use of digital technologies		
I use the Internet extensively and competently.	4.18	.630
I am open to and curious about new apps, programs, and resources.	4.17	.706
I find it easy to work with computers and other technical equipment.	4.03	.773
I am a member of various social networks.	3.65	1.059
Work environment criteria		
The institution invests in updating and improving the technical infrastructure.	4.17	.718
The institution promotes the integration of digital technologies in teaching.	4.17	.755
The institution provides the necessary technical support.	4.15	.815
Interactive whiteboards, projectors, or similar presentation media are available in my teaching rooms.	4.07	.933
The internet connection of the institution is reliable and fast.	3.96	.981
The department supports the development of my digital competence, e.g., through continuous professional development activities.	3.88	.923
Students have access to digital devices.	3.67	.891
Many of my colleagues use digital media in their courses.	3.37	.868

When the status of teacher educators in terms of private usage of digital technologies is examined in Table 4, it is seen that they use the Internet competently, they are curious about using new applications, programs, and resources, and they find it easy to use computers and technical equipment. However, the status of being a member of social networks is at a moderate level. On the other hand, teacher educators consider the institution they work in to

be adequate in terms of digital infrastructure and support. However, students access to digital devices is relatively limited, and their colleagues think they need to use digital media more in their classes.

Teacher Educators' Digital Competence Level

The data obtained for the digital competence levels of teacher educators were analyzed, and the number of persons in the competence levels in each main competence area is presented in Table 5.

Table 5

Digital Competence Level Distribution in Six Main-Competence Areas

Digital Competence Areas*		*Min-Max*	*Mean*	*Number of Persons at Competence Levels***					
				A1	*A2*	*B1*	*B2*	*C1*	*C2*
Area 1	Professional Engagement	4-16 points	9 points (B1)	3	36	42	22	9	1
Area 2	Digital Resources	3-12 points	7 points (B1)	8	21	27	42	14	1
Area 3	Teaching and Learning	4-16 points	9 points (B1)	8	30	31	30	8	6
Area 4	Assessment	3-12 points	7 points (B1)	7	32	38	23	10	3
Area 5	Empowering Learners	3-12 points	7 points (B1)	4	36	36	18	16	3
Area 6	Facilitating Learners' Digital Competence	5-20 points	10 points (B1)	19	16	44	24	6	4

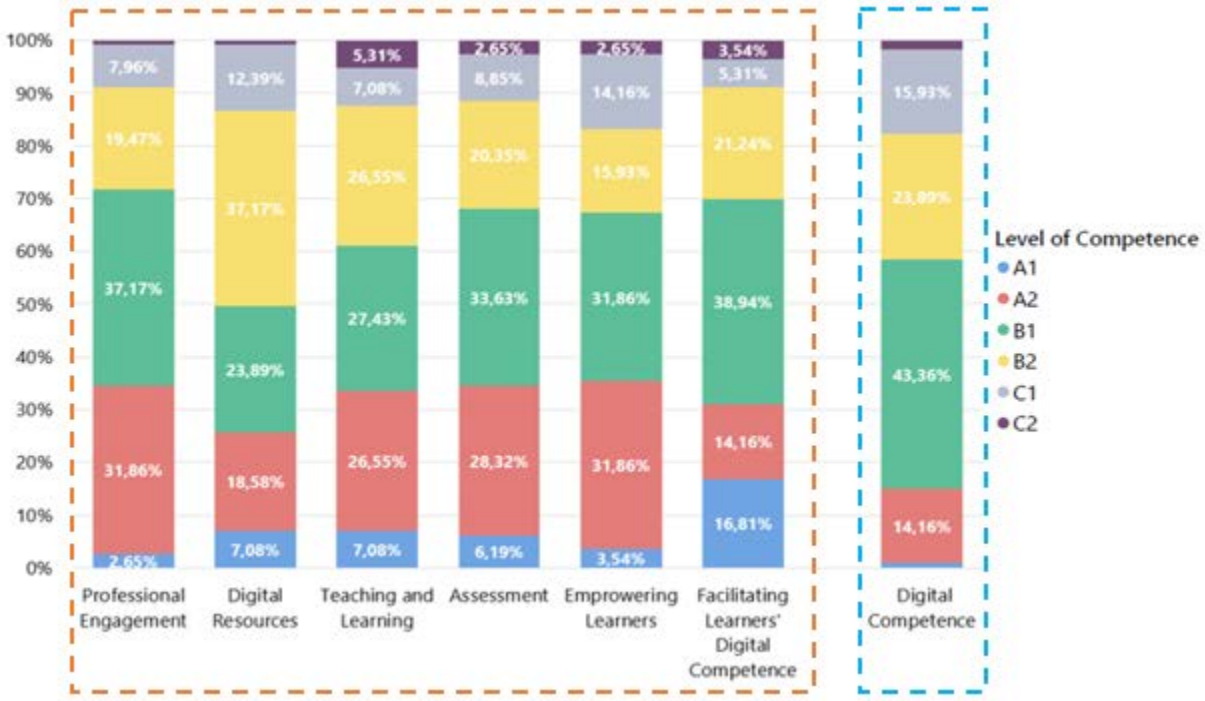
*Area 1: Educators' professional competencies; Area 2-5: Educators' pedagogic competencies; Area 6: Learners' competences

** The scoring in Table 3 is based on determining digital competence levels.

When Table 5 is examined, the digital competencies of teacher educators and their competencies for each of the main-competences areas are at the B1 level. The number of teacher educators at a total of C1 and C2 levels is higher in Areas 2 (f=15), 3 (f=14), 4 (f=13), and 5 (f=19), which are the areas of pedagogical competencies. On the other hand, the number of teacher educators at the C2 level, which is the highest level, is mostly concentrated in Area 3 (f=6). The highest number of teacher educators is in Area 6 (f=19) at the A1 level. The percentage distribution of digital competence levels of teacher educators for each main-competence area and general digital competence are also presented in Figure 3.

Figure 3

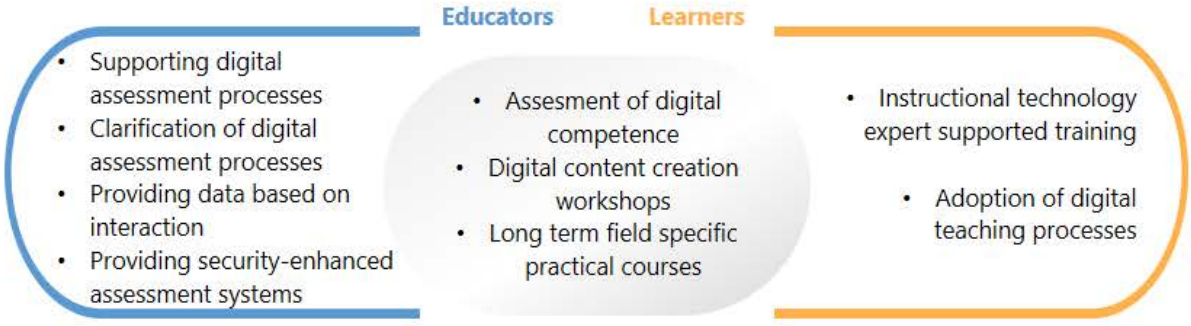
Digital Competence Level Distribution in Six Areas



In the interviews with teacher educators, the educators expressed some of their suggestions/expectations for developing digital competence levels. In Figure 4, these suggestions/expectations are presented under the titles of educators and learners.

Figure 4

Suggestions/Expectations of Teacher Educators for the Development of Digital Competencies



Some of the statements of teacher educators regarding the suggestions/expectations for developing digital competencies are given below.

"In my opinion, these technological training should be given to us, the educator, first of all. We, the instructors, need to be trained so that we can train the people we train..." (P5)

"Then I tried to figure it out through individual effort. I attended digital workshops or other activities. Nevertheless, I think this should be given to academicians as an education in the university context. Especially these web 2.0 tools are basic at this point, but an important

step. With this training, they should be informed about how to use these technologies in their lessons." (P6)

"What does the student do in the system? Does he watch the videos I post? Or when he watches? Did he download the resources during the midterm exam week?... or did he download and read it for a day, so it would be useful for us to get that information? Indeed, it would be beneficial." (P2)

Digital Competencies and Experiences of Teacher Educators in their Areas of Competence

Quantitative and qualitative data were analyzed to examine teacher educators' digital competence levels and experiences for each sub-competence area. Below, first of all, teacher educators' competence levels for the items in each sub-competence area, and then the actions and expressions they perform in the teaching processes for the relevant area, are given.

Professional engagement

The competence levels of teacher educators regarding the sub-competence area items for professional engagement and the actions and expressions they performed for the relevant area are presented in Table 6.

Table 6

Competence Levels Regarding the Items for Professional Engagement

Sub-Competence Area	*Items*	*Mean*
Digital CPD	1. I participate in online training opportunities E.g., online courses, MOOCs, webinars, virtual conferences...	2.69
Organizational communication	2. I systematically use different digital channels to enhance communication with students and fellow academics	2.21
Reflective practice	3. I actively develop my digital teaching skills	2.21
Professional collaboration	4. I use digital technologies to work together with colleagues inside and outside my educational organization	1.91

When Table 6 is examined, it is seen that teacher educators have higher levels of competence in improving their teaching skills and establishing digital communication, mainly by providing digital sustainable personal development. These dimensions were standard in the interviews with teacher educators. Teacher educators stated that to ensure their digital personal development, they took actions such as participating in online training, participating in workshops, and receiving digital mentoring support by rapidly adapting to digital activities, especially with the COVID-19 pandemic. Sample statements of teacher educators regarding these actions are given below.

"For example, we participate in seminars, conferences, and meetings related to our profession in online environments." (P4)

"For example, I attended workshops. There were digital competence workshops, and I attended them. It is like a deep sea that maybe we can only catch things from the tip of the ear. Because a new one of what we caught will come out and continue to come out." (P6)

Digital resources

The competence levels of teacher educators regarding the sub-competence area items for digital resources, the actions they took in the related area, and their expressions are presented in Table 7.

Table 7

Competence Levels Regarding the Items for Digital Resources

Sub-Competence Area	*Items*	*Mean*
Creating & modifying	1. I create my digital resources and modify existing ones to adapt them to my needs	2.59
Selecting	2. I use different internet sites and search strategies to find and select a range of different digital resources	2.30
Managing, protecting, sharing	3. I effectively protect sensitive content, e.g. exams, students' grades, personal data	2.26

When Table 7 is examined, teacher educators have a high level of competence regarding creating their digital resources in the teaching processes and modifying the existing digital resources according to needs. The level of competence for selecting and managing digital resources is at a medium level. In the interviews with teacher educators, they stated the types of digital resources they use and the methods they prefer regarding dimensions such as creating, accessing, selecting, and managing these resources. Teacher educators described the creation of their digital resource pools in the process and the assurance of the copyrights of these resources by the relevant institution as factors that facilitate the use of digital resources. Details on the use of digital resources by teacher educators are presented in Figure 5. Then, statements about these dimensions are given.

Figure 5

Digital Resources Usage

"Especially in distance education, I prepare course presentations. For example, I use canvas." (P5)

"Now, first of all, the most used digital material is PowerPoint presentations. … On LMS, I put the links of the videos that I think are appropriate for the level of our students, that I think are educational, and the links of the videos related to the subject by watching them, especially among the dozens of videos I chose from YouTube." (P1)

"I have folders of my lessons on my computer. I store the 1st semester, the 2nd semester in those folders. Then I upload to LMS from there." (P3)

Teaching and learning

The competence levels of teacher educators regarding the sub-competence area items for teaching and learning and the actions and expressions they performed in the related area are presented in Table 8.

Table 8

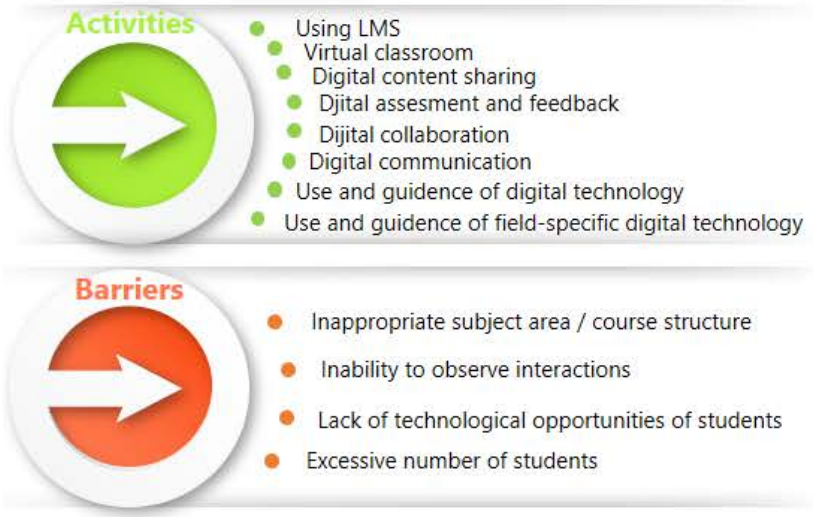
Competence Levels Regarding the Items for Teaching and Learning

Sub-Competence Area	*Items*	*Mean*
Guidance	1. I monitor my students' activities and interactions in the collaborative online environments we use	2.51
Teaching	2. I carefully consider how, when, and why to use digital technologies in teaching to ensure that they are used with added value	2.32
Self-regulated learning	3. I use digital technologies to allow students to plan, document and monitor their learning. E.g., quizzes for self-assessment, e-Portfolios for documentation and showcasing, and online diaries/blogs for reflection...	2.28
Collaborative learning	4. When my students work in groups or teams, they use digital technologies to acquire and document evidence	2.27

When Table 8 is examined, it is seen that the competence levels of teacher educators regarding the teaching and learning processes are at a medium level. In the interviews with the teacher educators, they mentioned many pedagogical activities that they carried out using digital technologies in their teaching processes and the difficulties they encountered while carrying out these activities. In Figure 6, the activities carried out by teacher educators using digital technology in the teaching and learning process are given as the difficulties they encounter. Then, their statements about these activities are given.

Figure 6

Digital Technology Usage in the Teaching Process (Activities and Barriers)



"I was not using LMS before the pandemic process. Now I am using LMS. It is something that the pandemic has brought. Because we do the exams over LMS, we do the homework over LMS. We do all the presentations over LMS." (P1)

"I was uploading the presentation to LMS, I was uploading a publication, I was uploading a book chapter. So I was loading materials there." (P4)

"I tried to conduct the lessons in cooperation like this because they like it more when I conduct them in collaboration, when I assign them homework, when I make them make presentations, and when I have them do certain things in the digital environment." (P5)

Assessment

The competence levels of teacher educators regarding the sub-competence area items for assessment, the actions they took in the related area, and their expressions are presented in Table 9.

Table 9

Competence Levels Regarding the Items for Assessment

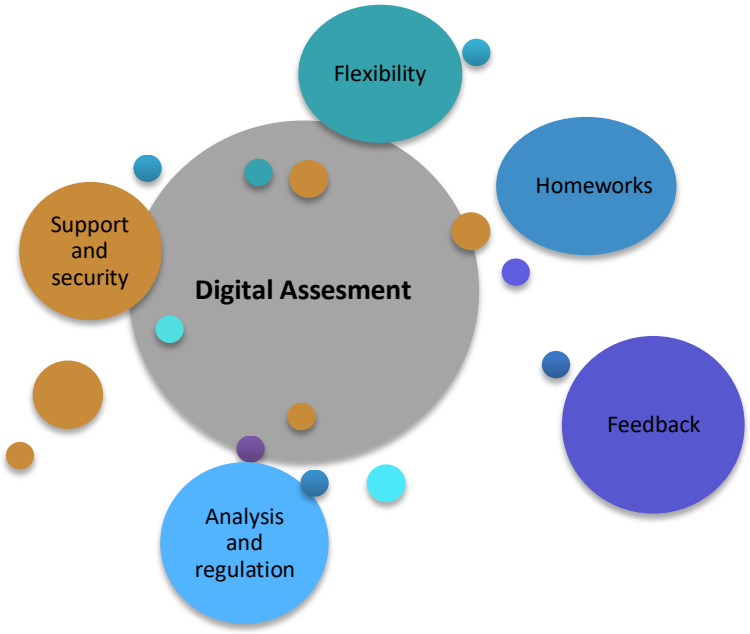
Sub-Competence Area	*Items*	*Mean*
Feedback & planning	1. I use digital technologies to provide effective feedback	2.35
Assessment strategies	2. I use digital assessment formats to monitor student progress	2.31
Analyzing evidence	3. I analyze all data available to me to timely identify students who need additional support	1.91

When Table 9 is examined, it is seen that teacher educators have higher levels of competence regarding using digital technologies in the assessment processes to monitor the development of students and provide feedback. However, the level of competence regarding

analyzing the data received from digital systems and using it in assessment processes needed to be higher. In interviews with teacher educators, they stated that they use digital technologies for formative and summative assessment. However, despite the support materials and guides for the digital assessment processes provided by the institution they work for, it was emphasized that the reliability problems in the digital assessment processes and the negative perception brought about by the inexperience in the use of digital assessment systems emerged as a complicating obstacle in front of this process. In addition, the need for more learners' technological opportunities and the high number of learners making feedback difficult are also stated as obstacles to digital assessment processes. In Figure 7, the practices in the digital assessment processes and then their statements about these practices are given.

Figure 7

Digital Technology Usage in the Assessment Process



At first, I did my exams in the form of online assignments because it was important for us to see what they knew. I wanted an exam system where they would write their sentences and make their explanations. (P3)

So people usually do like this. Here are my username and my password. You log in on my behalf. In other words, did the person do it or not, or did he/she answer the homework or exam? We cannot be sure of that. That is why I am worried.... (P1)

Empowering learners

The competence levels of teacher educators regarding the sub-competence area items for empowering learners, their actions in the related area, and their expressions are presented in Table 10.

Table 10

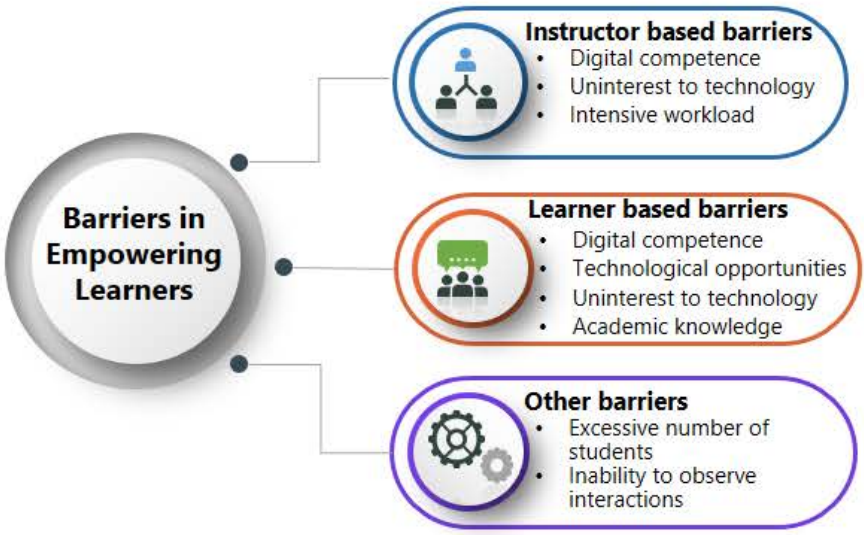
Competence Levels Regarding the Items for Empowering Learners

Sub-Competence Area	*Items*	*Mean*
Differentiation & personalisation	1. When I create digital assignments for students, I consider and address potential digital problems E.g., equal access to digital devices and resources, interoperability and conversion problems, lack of digital skills	2.58
Actively engaging learners	2. I use digital technologies for students to participate in classes actively	2.38
Accesibility & inclusion	3. I use digital technologies to offer students personalized learning opportunities E.g., I give different students different digital tasks to address individual learning needs, preferences, and interests	1.84

When Table 10 is examined, it is seen that teacher educators have high levels of competence regarding ensuring accessibility and active participation in digital technology-based activities to empower learners. However, the competence levels regarding the item for personalization and differentiation could be a lot higher. The interviews with teacher educators stated that their actions to empower learners were limited to directing students to digital resources suitable for them and ensuring their active participation by motivating students. They stated they encountered many complicated barriers in implementing actions to empower learners. In Figure 8, the barriers that teacher educators encountered in empowering learners and their related statements are given.

Figure 8

Barriers to Empowering Learners



> *"I think that my digital skills are sufficient in communicating with my colleagues, but insufficient in communicating with students, that is, in terms of using them in education." (P1)*

"Let me tell you this way. I can follow it like this since there are two students in the course, I can always ask questions during the course and understand the student's situation this way. In other words, if there is a class of 20 or 30 students, it is difficult to follow the students, especially in distance education." (P1)

Facilitating learners' digital competence

The competence levels of teacher educators regarding the sub-competence area items for facilitating learners' digital competence, their actions, and statements regarding the relevant area are presented in Table 11.

Table 11

Levels of Competence Regarding the Items for Facilitating Learners' Digital Competence

Sub-Competence Area	*Items*	*Mean*
Communication	1. I set up assignments that require students to use digital means to communicate and collaborate with an outside audience	2.25
Content creation	2. I set up assignments that require students to create digital content E.g., videos, audio, photos, digital presentations, blogs, and wikis.	2.24
Information & media literacy	3. I teach students how to assess the reliability of information and identify misinformation and bias	2.12
Problem-solving	4. I encourage students to use digital technologies creatively to solve concrete problems E.g., to overcome obstacles or challenges emerging in the learning process	1.98
Responsible use	5. I teach students how to behave safely and responsibly online	1.92

When Table 11 is examined, it is seen that teacher educators have high levels of competence regarding facilitating learners' digital competence, digital communication and cooperation, digital content creation, and digital literacy competencies, respectively. In the interviews with teacher educators, they stated that, within the scope of facilitating learners' digital competence, they were trying to make students collaborate in digital environments, make presentations in digital environments, encourage digital content development, and guide them on fair use in the use of all these digital technologies. However, they noted that facilitating learners' actions on behalf of digital competence remained limited due to some complicating factors. Below is the statement of a teacher educator.

And, of course, some students are inclined towards digital and love it. Some students say I have prepared something like this even if I do not give the homework. Can you evaluate it? Can you take a look? Curious, I prepare something by myself whenever I have free time. Nevertheless, on the other hand, we have to force some students to do things. (P6)

Discussion, Conclusion, and Implications

This study examined the digital competence levels of teacher educators and their experiences with using digital technology in education processes. According to the results

obtained from the research, it was seen that almost all teacher educators use LMSs. Thus, they often use presentation and video materials and assessment tools such as quizzes and pools. Especially during the COVID-19 pandemic, educators quickly adapted and started using LMS in the teaching process (Junus et al., 2021; Pereira & Guerreiro, 2021). On the other hand, within the scope of digital competence levels, digital technologies such as blogs, wikis, concept maps, and posters, which require higher-level skills and cover different types of digital content development processes, are limited. While synchronous collaborative tools, pre-recorded videos, and LMS were widely used during the pandemic period, the use of advanced educational technology remained low (Bond et al., 2021). In the literature, it is stated that teacher educators use digital technologies at an elementary and theoretical level (Blayone et al., 2018; Jwaifell et al., 2019; Røkenes & Krumsvik, 2016) and do not carry out pedagogical practices at a level that can be models by integrating them into the education process (Amhag et al., 2019; Ranieri & Bruni, 2018). However, according to the study results, the fact that teacher educators have high self-efficacy, interest, and curiosity in using digital technologies and that they evaluate the technical infrastructure of the work environment as good is a promising situation for them to develop their digital competencies. As a matter of fact, in the literature, it is emphasized that personal factors such as the attitude towards technology use and the frequency of use of digital technologies are of greater importance compared to contextual factors in the development of digital competencies (Cattaneo et al., 2022; Lucas et al., 2021). It can also be said that the pandemic process had a positive effect on improving the digital competencies of educators.

According to the assessment results of digital competence levels of teacher educators, there are more teacher educators at the B1 (Integrator) and B2 (Expert) levels, which generally represent medium-level competencies. Educators at both levels are curious and open to innovations (Redecker, 2017). However, educators at these levels should be supported in gaining higher-level competencies, such as using digital technologies, by supporting them with pedagogical approaches and providing guidance to other educators. In addition, teacher educators' reflection on such high-level competencies in their teaching processes plays a vital role in encouraging pre-service teachers to use digital technologies as pedagogical tools as part of their vocational teaching skills, as well as supporting their learning processes (Fullan & Langworthy, 2014; Ghomi & Redecker, 2019; Instefjord, 2014; Røkenes & Krumsvik, 2014).

Another remarkable result obtained from the study is that although the number of educators at the C2 (Pioneer) level, which is the highest level, is low, teaching and learning competence intensifies. On the other hand, although the number of educators at the lowest level, A1 (Newcomer), is low, there has been intensification at this level, especially in facilitating learners' digital competence. With the COVID-19 pandemic, face-to-face education processes were suddenly switched to ERT. Even educators who have no interest in digital technologies had to develop themselves even at the primary level in terms of digital competencies, as it was expected from the educators in the ERT process to have the competencies for the effective use of some digital technologies in the learning processes in terms of technical and pedagogical aspects (Arah, 2012; Baran et al., 2013; Varvel, 2007). It is emphasized in the literature that the frequency of the use of digital technologies by educators in teaching processes directly affects the development of digital skills (Cattaneo et al., 2022). On the other hand, the need to support learners' digital competencies in this process can also be interpreted as educators' plans for developing digital competence to carry out teaching processes. In developing students' digital

competencies, they emphasized the importance of cooperation between instructional technology experts.

The digital competencies of teacher educators for professional engagement processes are mostly at B1 (Integrator) level. In this direction, they generally use digital technologies at the primary level to improve their teaching skills by ensuring sustainability in communication and personal development. Especially with the COVID-19 pandemic, the widespread use of digital technology in communication and teaching has made educators need to update themselves in professional processes (Rana & Rana, 2020). Studies have also shown that most people, regardless of their profession, are more competent in the general digital communication skills they usually use (chat, forum, videoconferencing, e-mail, etc.). However, educators need to develop specific digital skills for teaching methods (creating and managing meaningful online activities, knowing how to use the educational platform, structuring an online topic, etc.) that will increase students' learning performance with appropriate professional development programs (Portillo & de la Serna, 2021; Portillo et al., 2020).

When the competencies of teacher educators in using digital resources are examined, it has been determined that they generally create their digital resources or use existing ones in line with their individual needs. However, it has been noted that these digital resources generally consist of presentations, written documents, and synchronous virtual classroom recordings. In this process, it was seen that they benefited from basic strategies in accessing, selecting, and managing digital resources. As a matter of fact, in some studies in the literature, it has been revealed that educators generally use primary digital resources in their educational processes, but they do not prefer multimedia materials (interactive videos, posters, etc.) that require complex digital skills (Blayone et al., 2018; Jwaifell et al., 2019). The preferences of educators in this direction are directly related to their digital resource development competencies. It has been determined that teacher educators see the copyright assurance provided by their institutions as an encouraging factor in using digital resources. Teacher educators use various digital communication channels to integrate existing digital technologies (in-class technologies, etc.) and content (presentations, videos, etc.) into the learning process and to interact effectively with students in the guidance processes. However, it has been determined that the reflection of these skills in practice varies considerably among teacher educators. Therefore, it has been observed that higher-level activities were at the primary level. On the other hand, it has been revealed that educators need support for applications that require high-level digital skills, such as receiving and evaluating interactive data recorded in digital environments in their teaching processes. In addition, it is stated in the literature that weaknesses in ERT increase, especially when it comes to situations or tools related to online teaching (Portillo et al., 2020).

Teacher educators' skills in digital assessment processes are mostly at B2 (Integrator) level. In addition, educators generally use digital technologies in the evaluation phase to monitor the development of students and provide feedback to evaluate the process with assignments. They see flexibility in terms of time and space as an advantage. However, they need support in analyzing the data received from digital systems and using them in the evaluation processes. On the other hand, inexperience in using digital assessment systems and the reliability problems encountered in the process cause educators to develop negative perceptions about using technology in the assessment processes. In parallel with this result, challenges such as

academic dishonesty, infrastructure, coverage of learning outcomes, and commitment of students to submit assessments are stated in the remote assessment (Guangul et al., 2020).

The main strategies implemented by teacher educators at the point of empowering learners are to ensure learner accessibility and active participation in digital technology-based activities they use in teaching processes. However, it has been revealed that learners need support in identifying and empowering their characteristics by carrying out activities for differentiation/personalization. Learning analytics (LA) tools are standard in empowering learners. Educators may have needed to be stronger in these respects because they needed the opportunity to use LA tools. Studies also showed that adopting LA is mainly tiny in scale and isolated at the instructor level (Tsai et al., 2020). On the other hand, educators also mentioned barriers such as heavy workload, the high number of students, and low digital competence.

The study revealed the digital competencies of teacher educators in detail with a mixed approach. However, the study is limited to the education faculty of a university in Türkiye. In addition, the fact that digital competence was evaluated with a self-reported assessment tool is another limitation of the study. Since the ERT process during the pandemic requires educators to use digital devices and platforms, it has improved their essential digital competencies and realized the significance of using digital technologies after the pandemic. For teacher educators, choosing and integrating these communication channels more strategically takes them to a higher level of professional engagement. It will help them save time and make communication more effective and transparent. On the other hand, sharing materials and experiences in online communities will enable them to have an enriching experience on a personal and professional level. Moreover, being aware that technology is constantly changing, making improvements in the digital tools they are currently using, and constantly sharing with their colleagues about the use of current digital technologies in education will be beneficial in developing their digital competencies.

The resource pools consisting of institutional and national open educational resources to support educators' digital resource use processes should be created, and copyright measures should be taken for the use of these resources. In addition, units can be established in higher education institutions to support educators at the point of digital content development and content development platforms that empower cooperation between colleagues. On the other hand, with the opportunities offered by digital technologies, the learning needs of learners can be systematically monitored, and appropriate interventions can be made when necessary. Concerning this result, it has been revealed that teacher educators pay great attention to supportive activities, especially regarding digital assessment processes. Since teacher educators train the teachers of the future, their competence in the dimensions of empowering learners and facilitating learners' digital competence is vital. Empowering the digital competencies of pre-service teachers in their education processes is decisive for the effectiveness of technology integration practices in their future classrooms. Creating strategies for the effective use by higher education institutions by integrating LA tools into their systems, regular evaluation of the online behaviors, and digital competencies of educators and students will make digital transformation in higher education more sustainable.

In future studies, the competencies of teacher educators can be examined comprehensively by collecting data from a larger sample group and associating them with different variables.

Versatile assessments can be made by developing and applying a performance-based digital competence assessment tool. Relational results can be revealed by evaluating the digital competencies of pre-service teachers and teacher educators. The effects can be investigated by designing and implementing field-based applied professional development training to improve teacher educators' digital competencies.

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Authors' Contributions

Conceptualization SK, MBK; Data collection ALL; Methodology SK; Quantitative analysis RK, OAÜ; Qualitative analysis MBK, SK; Visualization RK, OAÜ; Writing-original draft MBK, SK; Writing-review and editing ALL. All authors read and approved the final manuscript.

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TÜRKÇE GENİŞ ÖZET

Öğretmen Eğitimcilerinin Dijital Yeterliklerinin DigCompEdu Çerçevesi ile Değerlendirilmesi

Giriş

Çağımızda dijital yeterliklerin oldukça önemli olduğu görülmektedir. Yükseköğretim kurumları için eğitimcilerin dijital yeterliklerinin geliştirilmesine yönelik politikaların/modellerin belirlenmesi sürecinde mevcut yeterlik seviyelerinin ve bu yöndeki beklentilerinin belirlenmesi oldukça önemlidir (Jwaifell vd., 2019; Virtič & Pšunder, 2010). Yükseköğretim kurumları; ancak veriye dayalı planlamalar ile eğitimci yeterliklerini geliştirmeye dönük faaliyetler gerçekleştirebilir ve böylelikle öğrencilerini dijital çağa uygun bir şekilde yetiştirebilir, eğitim seviyesini üst düzeyde tutabilirler (Littlejohn vd., 2011).

Yükseköğretim kurumlarının önemli paydaşlarından olan öğretmen eğitimcilerinin teknolojiye bakış açısının diğer eğitimcilerden farklı olması beklenir. Çünkü yetiştirilen hedef kitle öğretmen adaylarıdır ve kullanılan her bir teknolojinin eğitim süreçlerinde etkili bir şekilde nasıl kullanılabileceğinin gelecekteki kullanım süreçlerini yönlendirmek için doğru bir şekilde modellenmesi gerekir (Krumsvik, 2011; Røkenes & Krumsvik, 2014). Bir başka ifadeyle dijital teknolojilerin etkili pedagojik uygulamalar eşliğinde kullanılması ve bu teknolojilerin öğrenme stratejileri ve öğrencilerin dijital becerilere yönelik kazanımları üzerindeki etkisinin farkında olunması gerekir (Instefjord, 2014; Rana & Rana, 2020). Bu nedenle geleceğin öğretmen adaylarını yetiştiren öğretmen eğitimcilerinin dijital yeterliklerinin incelenmesi, elde edilen sonuçlar doğrultusunda gerekli politikaların belirlenmesi oldukça önemlidir (Cabero-Almenara vd., 2020; Jwaifell vd., 2019; Littlejohn vd., 2011; Virtič & Pšunder, 2010). Bu durum COVID-19 salgını sürecinde çok daha fazla önem kazanmıştır.

Salgın süreci göstermiştir ki eğitimin her kademede ve her koşulda kesintiye uğramadan etkili bir şekilde devam ettirilebilmesi için dijital dönüşüme odaklanılmalıdır. Geleceğin öğretmenlerini yetiştiren öğretmen eğitimcilerinin bu süreçte dijital teknolojileri kullanım durumlarının ve dijital yeterlik seviyelerinin belirlenmesi geleceğe yönelik eğitim politikalarının oluşturulmasında önemlidir. Bu doğrultuda bu çalışmanın amacı öğretmen eğitimcilerinin dijital yeterlik seviyelerinin ve eğitim süreçlerinde dijital teknoloji kullanımına yönelik deneyimlerinin 'Eğitimciler için Dijital Yetkinlikler (DigCompEdu) Çerçevesi'ne dayalı olarak incelenmesidir.

Bu amaç kapsamında aşağıda yer alan araştırma sorularına cevap aranmaktadır:

(1) Öğretmen eğitimcilerinin dijital teknolojileri kullanım durumları ne düzeydedir?

(2) Öğretmen eğitimcilerinin dijital yeterlik seviyeleri ne düzeydedir?
(3) Öğretmen eğitimcilerinin dijital yeterlik alanlarına yönelik eylemleri ve görüşleri nasıldır?

Yöntem

Öğretmen eğitimcilerinin dijital yeterlik seviyelerini belirlemek amacıyla yürütülen çalışmada karma araştırma yöntemlerinden açıklayıcı desen kullanılmıştır. Açıklayıcı desen, öncelikle nicel verilerin toplanarak analiz edilmesi, daha sonra nicel verileri açıklamak amacıyla nitel verilerden yararlanılması olmak üzere iki aşamadan oluşur (Fraenkel vd., 2012; McMillan & Schumacher, 2010). Çalışmaya Türkiye'de büyük bir devlet üniversitesinin eğitim fakültesinde görev yapan 113 öğretmen eğitimcisi katılmıştır. Çalışmanın nicel aşamasında öğretmen eğitimcilerinden "Eğitimcilerin Dijital Yeterlikleri için Avrupa Birliği Çerçeve Çalışması" kapsamında geliştirilen "DigCompEdu Check-In Tool" adlı değerlendirme aracı ile veriler çevrim içi olarak toplanmıştır (Caena & Redecker, 2019; Redecker, 2017; Redecker, 2018). Çalışmada değerlendirme aracının Türkçeye uyarlanan versiyonu, maddeleri yükseköğretime uygun hale getirilerek kullanılmıştır (Toker vd., 2021). Araçta eğitimcilerin demografik bilgileri, dijital teknolojileri kullanım durumları ve kurumsal olanaklara ilişkin görüşlerini belirlemek amacıyla 13 soru bulunmaktadır. Dijital yeterlik seviyesi belirleme bölümünde ise 22 çoktan seçmeli 5'li Likert türünde madde bulunmaktadır. Bu maddeler, 6 temel dijital yeterlik alanı ve 22 alt yeterlik seviyesini temsil etmektedir. Yeterliklerin her biri giderek artan altı farklı seviye ile (A1, A2, B1, B2, C1, C2) açıklanmaktadır. Çalışmanın nitel bölümünde DigCompEdu çerçevesinin boyutlarına dayalı olarak nicel verileri açıklamaya yönelik 6 sorudan oluşan yarı yapılandırılmış görüşme formu kullanılarak 6 eğitimci (4 erkek, 2 kadın) ile yarı-yapılandırılmış görüşmeler gerçekleştirilmiştir. Çalışmadan elde edilen nicel veriler betimsel istatistiki yöntemlerle analiz edilmiştir. Analizde SPSS 21 ve Microsoft Power BI kullanılmıştır. Nitel verilerin analizinde ise içerik analizi kullanılmıştır.

Bulgular

Çalışmadan elde edilen bulgulara göre öğretmen eğitimcilerinin öğrenme ve öğretme süreçlerinde dijital ortam olarak çoğunlukla Öğrenme Yönetim Sistemlerini (ÖYS), dijital materyal olarak ise sunumları kullandıkları görülmüştür. Öğretmen eğitimcilerinin dijital teknolojileri bireysel ve öğretim süreçlerinde kullanım durumları incelendiğinde ise interneti yetkin bir şekilde kullandıkları, yeni uygulamalar, programlar ve kaynakları kullanım yönünde meraklı oldukları, bilgisayarları ve diğer teknik araçları kullanmayı kolay buldukları görülmektedir. Bunların yanında öğretmen eğitimcilerinin çalıştıkları kurumu, dijital altyapı ve destek açısından oldukça yeterli gördükleri ortaya çıkmıştır.

Öğretmen eğitimcilerinin dijital yeterlik düzeyleri incelendiğinde, genel dijital yeterlik düzeylerinin ve alt alanların her birine yönelik yeterliklerinin B1 (Bütünleştirici) düzeyinde olduğu tespit edilmiştir. Öğretmen eğitimcilerinin her bir alt yeterlik alanına yönelik aşağıda vurgulanan maddelere ilişkin yeterlik düzeylerinin nispeten daha yüksek olduğu tespit edilmiştir:

- Mesleğinde dijital becerilerin kullanımı, dijital sürekli kişisel gelişimi sağlayarak öğretim becerilerini geliştirme ve dijital iletişim kurma

- Dijital kaynak, öğretim süreçlerinde kendi dijital kaynaklarını oluşturma ve mevcut dijital kaynakları ihtiyaca göre değiştirerek kullanma
- Öğretme ve öğrenme, dijital yeterlikleri öğretim ve rehberlik amaçlı kullanma
- Değerlendirme, dijital teknolojileri öğrencilerin gelişimini izleme ve geri bildirim sağlama amacıyla kullanma
- Öğrencileri güçlendirme, erişilebilirliğin sağlanması ve öğrencilerin öğretim süreçlerine aktif katılımlarının desteklenmesi
- Öğrencilerin dijital yeterliklerinin desteklenmesi, dijital iletişim ve dijital okuryazarlık becerilerinin geliştirilmesi

Öğretmen eğitimcilerinin yukarıda belirtilen dijital yeterlik alanlarına ilişkin eylem ve görüşleri incelendiğinde; dijital olarak kişisel gelişimlerini sağlama noktasında özellikle çevrim içi eğitimlere katılma, atölye çalışmalarına katılma ve dijital mentörlük desteği alma gibi çeşitli eylemlerde bulunduklarını ortaya çıkmıştır. Öğretmen eğitimcileri, kullandıkları dijital kaynak türleri ve bu kaynakları oluşturma, erişme, seçme ve yönetme gibi süreçlerde farklı yöntemlere başvurduklarını belirtmişlerdir. Bu süreçte dijital kaynak havuzlarının oluşması ve bu kaynakların telif haklarının ilgili kurum tarafından güvence altına alınmasını ise dijital kaynak kullanımını noktasında kolaylaştırıcı birer unsur olarak nitelendirmişlerdir. Diğer taraftan dijital teknolojileri kullanarak gerçekleştirdikleri öğretim aktivitelerinde öğrenci sayısının fazla olması ve öğrencilerin teknik imkanlarının yetersiz olması gibi çeşitli zorluklarla karşılaştıklarını belirtmişlerdir. Öğretmen eğitimcileri, görev yaptıkları kurum tarafından dijital değerlendirme süreçlerine yönelik sağlanan destek materyallerine ve rehberlere rağmen bu süreçlerdeki güvenirlik problemleri ve sistem kullanımı konusundaki deneyimsizliğin beraberinde getirdiği olumsuz algının bu sürecin önünde zorlaştırıcı bir engel olarak ortaya çıktığını vurgulamışlardır. Öğretmen eğitimcileri, öğrencileri güçlendirmek adına yaptıkları eylemlerin öğrencileri kendilerine uygun dijital kaynaklara yönlendirme ve onları motive ederek aktif katılımlarını sağlamakla sınırlı kaldıklarını belirtmişlerdir. Öğrencilerin dijital yeterliklerinin desteklenmesi için ise öğrencileri dijital ortamlarda iş birliği yaptırma, sunum yaptırma, içerik geliştirmeye teşvik etme ve tüm bu dijital teknolojilerin kullanım sürecinde adil kullanım konusunda yönlendirme yapmaya çalıştıklarını vurgulamışlardır.

Tartışma, Sonuç ve Öneriler

Çalışmada öğretmen eğitimcilerin dijital yeterliklerini karma bir yaklaşımla ayrıntılı olarak ortaya koyulmuştur. Salgın sürecindeki acil uzaktan eğitim uygulamaları, öğretmen eğitimcilerinin dijital cihazları ve platformları kullanımını zorunlu kıldığından temel dijital yeterliklerini geliştirmeleri ve salgın sonrasında da dijital teknolojilerin kullanımının öneminin farkına varmaları açısından olumlu etkilerini göstermiştir. Bu doğrultuda öğretmen eğitimcilerinin neredeyse tamamının ÖYS'leri kullandıkları ve sıklıkla sunum ve video türündeki materyaller ile kısa sınav (quiz) ve anket gibi değerlendirme araçlarına başvurdukları görülmüştür. Diğer taraftan dijital yeterlik seviyeleri kapsamında daha üst düzey becerileri gerektiren, farklı türlerde dijital içerik geliştirme süreçlerini kapsayan blog, wiki, kavram haritası ve poster gibi dijital teknolojilerin kullanımının oldukça sınırlı olduğu göze çarpmıştır. Ancak öğretmen eğitimcilerin dijital teknolojileri kullanma öz-yeterliklerinin, ilgi ve meraklarının yüksek olması, çalışma ortamlarının teknik alt yapısını iyi olarak değerlendirmeleri dijital yeterliklerini geliştirmelerinde umut vadeden bir durumdur.

Öğretmen eğitimcilerinin dijital yeterlik seviyeleri genellikle orta düzeydeki yeterlik seviyelerini temsil eden B1 (Bütünleştirici) ve B2 (Uzman) seviyesinde yoğunlaşmaktadır. Her iki seviyedeki eğitimciler de meraklı ve yeniliklere açıktır (Redecker, 2019). Ancak bu seviyelerdeki eğitimcilerin dijital teknolojilerin pedagojik yaklaşımlarla desteklenerek kullanılması, dijital teknolojilerin kullanılması süreçlerinde diğer eğitimcilere rehberlik sağlanması, güncel dijital teknolojilerin takip edilerek ilgili teknolojilerin pedagojik kullanımına ilişkin stratejiler geliştirilmesi gibi daha üst düzey yeterliklerin kazandırılması noktasında desteklenmesi gerektiği söylenebilir.

Gelecek çalışmalarda, öğretmen eğitimcilerin yeterlikleri daha geniş örneklem grubundan veri toplanarak farklı değişkenlerle ilişkilendirilerek kapsamlı bir şekilde incelenebilir. Öğretmen eğitimcileri ile birlikte öğretmen adaylarının da dijital yeterlikleri değerlendirilerek ilişkisel sonuçlar ortaya konulabilir. Öğretmen eğitimcilerinin dijital yeterliklerini geliştirmeye yönelik alan bazında uygulamalı mesleki gelişim eğitimleri tasarlanıp uygulanarak etkileri araştırılabilir.