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| Research Article / Araştırma Makalesi |

Design, Implementation, and Evaluation of Remote Mentoring Practices for Technology Integration in Higher Education

Yüksek Öğretimde Teknoloji Entegrasyonuna Yönelik Uzaktan Mentörlük Uygulamalarının Tasarlanması, Uygulanması ve Değerlendirilmesi

Asiye Pınar KÖKSAL TOPCU[1]

Keywords
1. Mentoring
2. Technology
3. Integration
4. Framework
5. TPACK

Anahtar Kelimeler
1. Mentörlük
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Abstract

Purpose: This study aims to support the development of faculty members in higher education who implement student-centered learning approaches by providing mentoring support for technology integration. The study also aims to assess the effects of these practices on both the faculty members and the teacher candidates attending their classes and to evaluate their applicability under the conditions of our country.
Design/Methodology/Approach: This study used a case study method, and data collection tools included observations, reflections, interviews, and lesson videos. The faculty members in higher education were mentored for 13 weeks, their lessons were followed, and observations were made on both the mentee and their students. The mentor wrote weekly reflections throughout the process, and lesson observations were recorded on an observation form. At the end of the process, the mentee was interviewed. Content analysis was used for data analysis.

Findings: During the study, a framework for remote mentoring for technology integration was designed and implemented, considering the TPACK framework. The study's results indicated that remote mentoring practices for technology integration in higher education positively influenced in-class teaching practices. In the following weeks, technology was actively used by both the mentee and the students, with careful attention given to digital materials and tools. Student groups also applied the practices provided during the mentoring process in their lesson presentations.

Highlights: Based on the positive findings, this research underscores the significance of mentoring practices for technology integration in higher education.

Öz

Çalışmanın amacı: Bu çalışmanın amacı, öğrenci merkezli öğrenme yaklaşımlarına dayanan öğretim programlarını uygulayacak yüksek öğretimde görevli öğretim elemanına teknoloji entegrasyonuna yönelik mentörlük desteği vererek onun gelişimini desteklemek ve bu uygulamaların hem öğretim üyesinde etkisini hem de dersine giren öğretmen adayları üzerindeki etkilerini, ülkemiz koşullarında uygulanabilirliğini ortaya koymaktır.

Materyal ve Yöntem: Bu çalışmada yöntem olarak durum çalışması, veri toplama aracı olarak da gözlemler, yansılar, görüşmeler ve ders videoları kullanılmıştır. Çalışma da yüksek öğretimde görevli öğretim üyesine 13 hafta boyunca mentörlük yapılmış, menteenin dersi takip edilmiş ve hem mentee hem de öğrencileri üzerinde gözlemler yapılmıştır. Süreç boyunca mentör tarafından her hafta için yansı yazılmış, ders gözlemleri oluşturulan gözlem formuna ayrıca not edilmiştir. Süreç sonunda ise mentee ile görüşme yapılmıştır. Verilerin analiz edilmesinde içerik analizi kullanılmıştır.

Bulgular: Çalışma sürecinde teknoloji entegrasyonuna yönelik uzaktan mentörlük için TPACK çerçevesi dikkate alınarak bir çerçeve tasarlanmış ve uygulanmıştır. Çalışmanın sonunda yüksek öğretimde teknoloji entegrasyonuna yönelik uzaktan mentörlük uygulamalarının sınıf içi öğretim uygulamalarının olumlu etkilediği, ilerleyen haftalarda teknolojiyi menteenin ve öğrencilerin aktif bir şekilde kullandığı, dijital materyal ve gereç kullanmaya özen gösterildiği, öğrenci gruplarının mentörlük sürecinde verilen uygulamaları kendi ders anlatımında kullandığı sonucuna ulaşılmıştır.

Önemli Vurgular: Olumlu bulgulara dayanarak, bu çalışma, yükseköğretimde teknoloji entegrasyonu için mentörlük uygulamalarının önemini vurgulamaktadır.

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INTRODUCTION

It is as essential for teachers, the most crucial part of the education system, to adapt to innovations (new teaching approaches, technological and scientific developments, etc.) during their careers as it is to enter the profession well-prepared. In this context, it is believed that it is essential for teacher educators to adopt new teaching approaches and to keep up with technological developments in education (Akdeniz & Paliç, 2012; Can, 2004; Kuloğlu & Akpınar, 2016). In a world that is constantly renewing and evolving, the biggest challenge developing countries face is the difficulty in improving educational activities to keep up with the globalizing world (Habacı, Karataş, Adıgüzelli, Ürker & Atıcı, 2013). Since a qualified student profile, which any country would wish to achieve, can only be ensured by high-quality teachers and faculty members, the continuously changing understanding of teacher training policies has negatively affected teacher quality. As a result, the desired productivity has not been achieved (Azar, 2010). It is suggested that to achieve the desired productivity in education, it is essential to move toward standardization by determining competencies in teacher training (Arslan, 2008). Accordingly, various methods exist to help teacher educators integrate technology into their lessons, and in developed countries, mentoring practices are employed to support educators.

Mentoring is the process in which an experienced educator provides assistance, support, guidance, and advice to help the professional development of their colleagues (Sullivan, 2000). Historically, mentoring has its roots in Greek mythology (Bakioğlu, 2015; Kılıç & Serin, 2017). The term "mentor" was first used in 17th-century France in the books of Fenelon, who taught the grandson of Louis XIV (Mueller, 2004; Kuzu, Kahraman & Odabaşı, 2012). In the Anatolian region, the concept of mentoring appeared as "atabeg" during the Seljuk period and as "lalalık" or "ahilik" in the Ottoman era (Kahraman, 2012).

In mentoring terminology, the person providing support is called the "mentor," while the person receiving support is called the "mentee," "menti," or "service recipient." A mentor acts as a guide, consultant, advisor, or leader, sharing their skills and experiences with less experienced individuals in their field (Aslan & Odabaşı, 2013; İlhan, 2013; Yirci, 2009). According to İlhan (2013), Kram, and Isabella (1985), a mentor is an expert in a particular field who provides participants with emotional and professional support by sharing their experience and knowledge. The mentee is defined as someone who seeks to develop their skills and needs the guidance of a more experienced colleague (Yirci & Kocabaş, 2012).

The mentor and mentee must harmonize their responsibilities for a successful mentoring process. This harmony ensures an effective and productive mentoring process, where knowledge and experience are continuously transferred throughout the process, and the desired goals are achieved (Kartal et al., 2017). In the mentor-mentee relationship, mutual respect and trust are crucial; the mentor should identify the mentee's problem areas and meet their needs, act as a role model, and encourage them to make their own decisions. It has also been found that humor and laughter positively influence the mentoring process, enhancing interaction between mentor and mentee and reducing the mentee's fear and anxiety (Bakioğlu, 2015).

To ensure a quality mentoring process, it is necessary to identify the characteristics of both mentor and mentee. A good mentor should possess qualities such as experience, patience, flexibility, creativity, planning, commitment to the process, willingness to help, communication skills, openness to learning, empathy, clear goals and objectives, relationship management skills, adherence to ethical standards, up-to-date knowledge, and the ability to provide effective feedback (Clasen & Clasen, 1997; Çakır, 2015; Daresh, 2003; Kahraman, 2012; Klasen & Clutterback, 2002; Yirci, 2009). Similarly, a good mentee should be ready for the mentoring relationship, eager to learn, organized, communicative, willing to share, and optimistic (Clutterbuck, 2014; Kahraman, 2012; Rowley, 1999).

Figure 1 shows the responsibilities of both mentee and mentor, the key elements of the mentoring process (Bakioğlu, 2015).

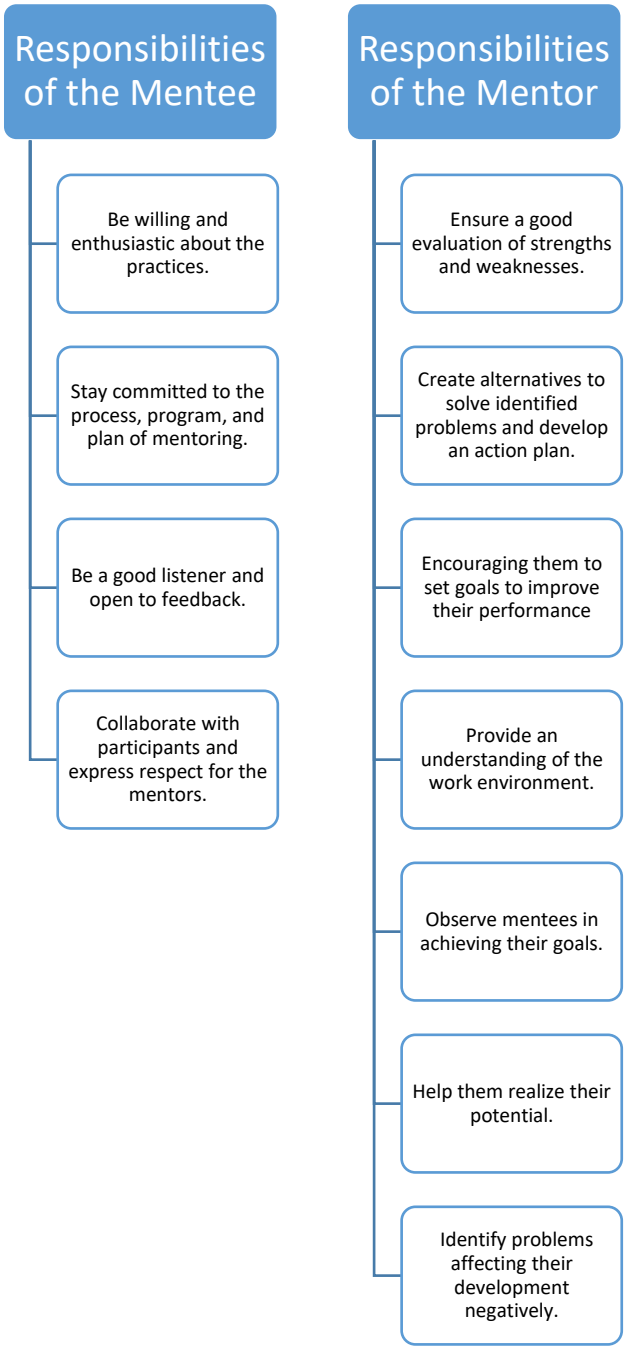

Figure 1. Responsibilities of the Mentee and Mentor

In the study, considering all these characteristics, a mentoring contract was signed between the mentee and mentor at the beginning of the process, and remote mentoring practices for technology integration were initiated.

Remote Mentoring for Technology Integration

The use of technology, especially in the teaching and learning process within the education system, has gained significant importance in recent years. Information and communication tools are widely used in preschool and primary education institutions as well as secondary and higher education institutions. The use of technology in education mentioned here refers to using technological tools in lessons and integrating technology into the teaching and learning process. Technology integration refers to the interdisciplinary application of instructional technology across all curriculum areas in appropriate and meaningful ways (Yirci, 2009). In other words, technology integration aims to select and use the appropriate technology relevant to the content to achieve the set objectives, thereby ensuring effective learning. Various methods are being tried to achieve this goal, and mentoring practices are included to support educators. The primary purpose of mentoring is to facilitate the participant's

learning and development (Brockbank & McGill, 2006). While the mentoring process is typically defined as the process where more experienced individuals assist less experienced individuals, within the scope of this study, the mentor supports the mentee's development by providing mentoring support focused on technology integration. The mentoring was conducted remotely. Remote mentoring is one of the best methods that can be used in situations such as the pandemic period we experienced in recent years. Remote mentoring involves managing the mentoring process independently of time and space using information and communication technologies such as email, computer, and web tools (Bierema & Merriam, 2002). In this regard, it can be said that this was one of the most suitable types of mentoring for this period.

Within the study, a framework for remote mentoring focused on technology integration was designed. The framework was developed with consideration of the TPACK framework.

Remote Mentoring Practices Focused on Technology Integration with Consideration of the TPACK Framework

Technological Pedagogical Content Knowledge (TPACK) contributes to how an educator transforms technological tools into pedagogical strategies and content representations for teaching a specific subject and how these affect student learning (Graham et al., 2009). TPACK is a framework that focuses on the intersection of content, pedagogy, and technology knowledge in technology integration (Abbitt, 2011) and explains teachers' understandings of how these knowledge domains can interact (Harris et al., 2009).

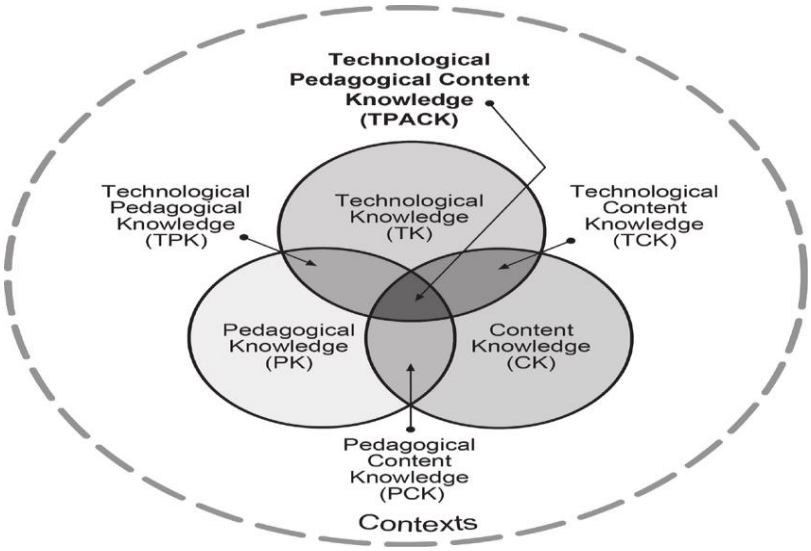

Figure 2. Scope of Technological Pedagogical Content Knowledge (TPACK)

The TPACK theoretical framework is based on the idea that teacher knowledge necessary for teaching in technology-rich environments derives from three sources: content knowledge, pedagogical knowledge, and technological knowledge. It focuses on the relationships and interactions between these components. In this context, the TPACK framework identifies seven knowledge domains that teachers should possess to integrate technology into teaching: Content Knowledge, Pedagogical Knowledge, Technological Knowledge, Pedagogical Content Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, and Technological Pedagogical Content Knowledge (Agyei & Voogt, 2012; Koehler & Mishra, 2008). The TPACK theoretical framework, which is considered a useful framework to support technology integration in educational practices (Horzum, 2013), has been of interest since the day it was first put forward, as it has been a pioneer in the effective integration of technology into education (Baran & Canbazoğlu Bilici, 2015) and provides information on how teachers should use technology in the correct proportion and efficiently in the learning process (Handayani et al., 2023). Considering the TPACK framework is crucial in mentoring practices focused on technology integration.

Purpose of the Study

The purpose of this study is to support the development of faculty members in higher education who implement student-centered learning approaches by providing mentoring support for technology integration and to evaluate the effects of these practices on both the faculty members and the teacher candidates attending their classes, as well as their applicability under the conditions of our country. In line with this purpose, the following research questions were addressed:

1. How do technology integration-focused mentoring practices affect faculty members' in-class teaching practices?
2. How do technology integration-focused mentoring practices affect the mentee's technological competencies?

3. What are the effects of mentoring practices on the students?

4. How does the mentee evaluate the mentoring practices focused on technology integration?

It is hoped that this study will contribute to the literature by increasing the technology competence of faculty members, improving classroom teaching practices, and exploring the positive aspects of these effects on students through mentoring practices focused on technology integration, by taking into account the TPACK framework.

METHOD/MATERIALS

This study, which aims to support the development of faculty members in higher education by providing mentoring support for technology integration and to assess the impact of these practices on faculty members and the teacher candidates attending their classes, was conducted using a case study method. A case study is a methodological approach that involves an in-depth examination of a system by collecting systematic data through multiple methods to understand how the system operates (Chmiliar, 2010). Merriam (2013) defines a case study as an in-depth description and analysis of a bounded system. Meanwhile, Creswell (2007) describes a case study as a qualitative research approach where the researcher investigates one or more bounded cases over time through in-depth data collection involving multiple sources of information (observations, interviews, audiovisuals, documents, reports).

Profile of Mentee, Mentor, and Students

Information was gathered about the mentee, who serves as a lecturer in higher education, focusing on their research areas: students' self-regulation skills in homework, teachers' homework practices, students' perceptions of learning environment goals, personal goal orientations, and variables related to learning, as well as STEM education. Based on this, a list of potential mentoring services was created and shared with the mentee.

It was ensured that the mentor had the technological competence to be able to mentor and it was checked whether he/she had received sufficient training in this regard. The mentor's areas of training include Basic Robotics Course, Robotics and Software Education, STEM Education, Coordination and Program Development Training, Astronomy Education and Applications, Brain Games Training 1-2, Writing Activities for Learning Purposes, Quantitative Research Methods, Qualitative Research Methods, Mixed Research Methods, Augmented Reality Applications, and AppInventor applications. The mentor has also been a project manager, trainer, workshop leader, and consultant in numerous projects. These areas of education and interest were shared with the mentee to help the mentee gain insights and explore alternative aspects where they could receive mentoring support.

The student profile comprises 20 students taking the Instructional Principles and Methods course. Since this is a graduate-level course, the students come from different disciplines.

Stages of Technology Integration Application

The implementation of mentoring to the mentee in this study is outlined in the stages below:

I. Stage: Preparation

Table 1 explains the structure of the preparation stage, which was deemed necessary for revealing the mentoring framework to be developed.

Table 1. Preparation Stage

Preparation Stage		
Introduction-Observation-Evaluation	**Preparation Phase Feedback and Guidance**	**Setting Objectives and Goals**
• Collecting information about the mentee • Communication and introduction between mentor and mentee • Observation of the lesson related to the mentee • Identifying needs • Signing the mentoring agreement	• Based on initial observations and data obtained from discussions with the mentee, determining what the mentee needs in terms of technology and mentoring Placing the practices required for those needs • Continuing meetings with the mentee regarding these practices and making summaries and directives mainly by the mentor	• Setting objectives • Creating a plan • Finalizing the plan by creating the final version of the Work Calendar

II. Stage: Implementing Mentorship

This study carried out this stage over thirteen weeks, consisting of weekly regular sessions for the mentee and parallel classroom observations conducted in conjunction with these sessions. The steps of the Implementation stage, the second phase of the study, are outlined in Figure 3.

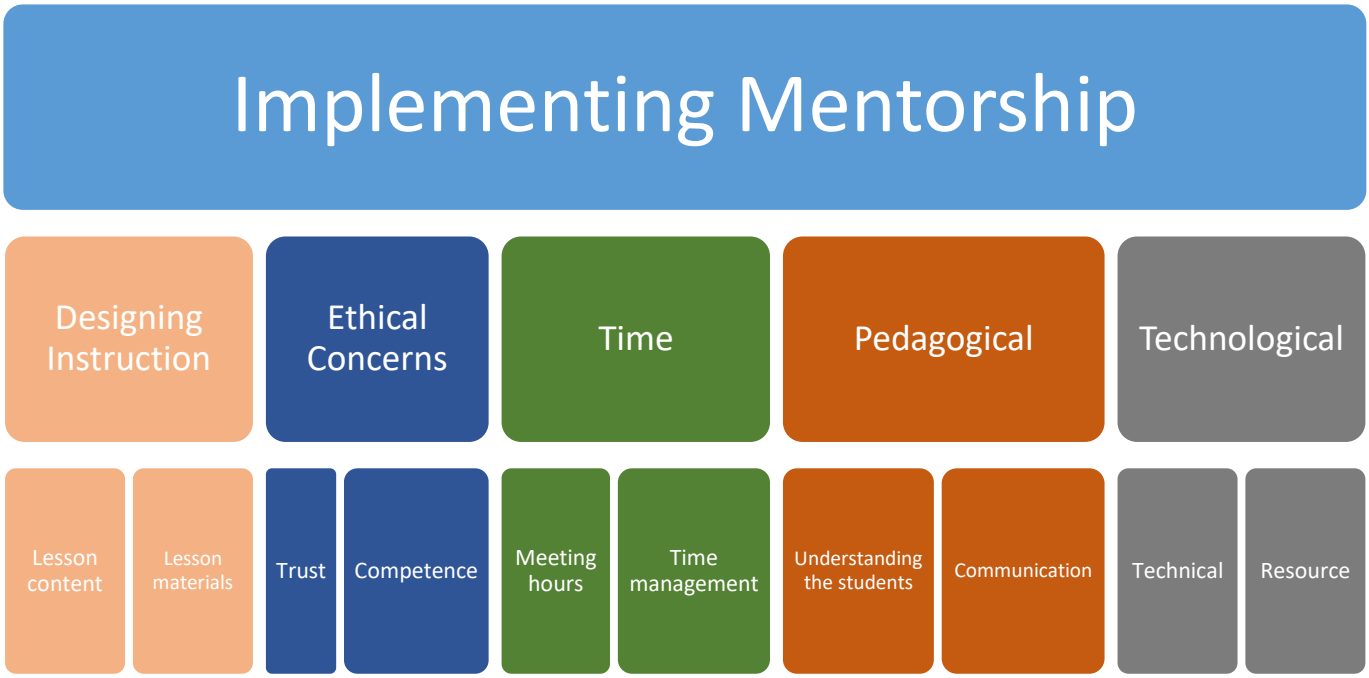

Figure 3.Implementing Mentorship

The TPACK framework was utilized in instructional design, pedagogy, and technology, especially at this stage.

III. Stage: Overall Evaluation

This study stage aimed to evaluate the effects of the mentoring framework developed during the study. The goal was to support the development of a higher education faculty member by providing mentoring support focused on technology integration and to investigate the impact of these practices on both the faculty member and the teacher candidates in their classes. The evaluation was done through class observations (in the mentee's Instructional Principles and Methods course), video recordings of the lessons, weekly reflections, and interviews.

Type of Mentoring Implemented: Remote Mentoring

In the study, the mentor and mentee conducted mentoring sessions on predetermined days and times each week. The mentoring practices were carried out remotely. Remote mentoring is managing the mentoring relationship independently of time and location using information and communication technologies such as email, computers, and web tools (Bierema & Merriam, 2002). Tools such as email, Zoom, WhatsApp, and phone calls were used within this framework. Additionally, reverse mentoring was employed in this study. In typical mentoring, the mentor is usually older than the mentee. However, in this study, the mentor was younger than the mentee. Reverse mentoring is often conducted for mentees who need assistance with technology, such as using computers or the Internet (Kahraman, 2012). In this study, the remote mentoring process generally progressed as follows:

After the mentor and mentee were introduced, the process began with identifying the applications for which the mentee needed mentoring support in technology based on initial observations and interviews with the mentee.

Discussions with the mentee continued about these applications, with the mentor providing summaries and guidance. Plans were made and finalized, and a work schedule was created. Each week, the mentor and mentee conducted mentoring sessions on the agreed-upon days and times, with the process carried out according to the plan and schedule. The mentoring sessions introduced various technological applications over 13 weeks. A period of 13 weeks was determined because it would take a long time to both increase an individual's technological competence and observe the effects of this competence.

Before each mentoring session, the mentor emailed the mentee worksheets prepared by the mentor. This ensured that the mentee understood the applications and could come prepared for the sessions.

Data Collection Tools

The data collection tools used in the study included observations, reflections, interviews, and lesson videos. Participants were informed at each scale and confidentiality was taken into account.

Observations and Videos of the Mentee's Instructional Principles and Methods Course

Over 13 weeks, the mentee's Instructional Principles and Methods lessons were observed, and video recordings were made to confirm the observations. The focus was on whether the mentoring practices were integrated into the lessons, the effects of technology integration-focused mentoring on the mentee's technological competencies (e.g., effective use of technology in lessons, designing or selecting technology-based materials), the impact on students, and whether students applied this integration in their presentations following the mentee's lessons. The mentor noted the observations using an observation form. Each week, behaviors were marked with an 'X' if performed and left unmarked if not. Additionally, weekly reflections were written by the mentor and recorded. The mentor took on a neutral observer role during the observations, taking notes and monitoring technical issues without intervening in the lessons, and later transcribed the observation results. The observation data were analyzed by the researcher at two different times and were also analyzed by a second researcher. While the agreement between the analyses made by the researcher at different times was found to be 85%, the agreement between the analyses made by the two researchers (Kappa Coefficient) was found to be 72%

Weekly Reflections

The activities carried out each week with the mentor and mentee according to the work schedule, the observations of the mentee's Instructional Principles and Methods course, and the overall evaluation of the process were recorded in the weekly reflections kept by the mentor. These reflections were used to summarize each week's activities, provide a detailed review of the process, and help answer the research questions. A second researcher was asked to analyze the reflection data.

Semi-Structured Interviews

At the end of the mentoring process, semi-structured interviews were conducted with the mentee to gather their views on the effects of technology integration-focused mentoring practices on their classroom teaching practices (e.g., student-centered teaching, using different methods, classroom management, communication with students, providing guidance, dealing with problems), on their technological competencies (e.g., effective use of technology in lessons, designing or selecting technology-based materials), the impact of mentoring on students, and the roles and changes in roles during the mentoring sessions. The mentee's responses were transcribed**.** The interview data were analyzed by the researcher at two different times and were also analyzed by a second researcher. While the agreement between the analyses made by the researcher at different times was found to be 90%, the agreement between the analyses made by the two researchers (Kappa Coefficient) was found to be 82%.

Data Analysis

Content analysis was used to analyze the data. Weekly reflections and interview data were analyzed descriptively using content analysis methods. In content analysis, the data is classified and examined within the framework of specific themes. After several readings, codes are created, and similar codes are grouped under appropriate categories (Yıldırım & Şimşek, 2006).

FINDINGS

Designing and Implementing the Framework of the Mentoring Process (Preparation - Implementation - Overall Evaluation)

From a broad perspective on the functions of mentoring, it is concluded that mentoring practices positively affect the individual, professional (academic), and career development of the mentee. It has been noted that the technology integration approach has been emphasized recently in mentoring. The mentoring process in this study began with an introduction and needs assessment, followed by a mentoring contract. For the mentoring practices to achieve the desired level of quality, the relationship between mentor and mentee must be clearly defined. A successful mentor must possess listening, motivation, influence, evidence collection, collaboration, consulting, time management, and professional development skills. In mentoring

practices, the mentor's role includes guiding the mentee, answering questions, developing the mentee's skills, maintaining long-term interaction, providing observation and feedback, offering personal support, serving as a role model, improving academic achievement and expectations, fostering effective and lasting learning, and contributing to professional development. This process was completed with the mentoring contract. Goals were then set, and a work schedule was created. Technical and technological resources were identified, and the mentor attended the mentee's classes to assist in achieving TPACK proficiency and provide pedagogical support while getting to know the students.

Throughout the process, mutual information exchange occurred between the mentor and mentee, with the mentor demonstrating essential skills in helping the mentee set goals and supporting the mentee through practical applications.

For a successful mentoring process and to alleviate ethical concerns, the mentor and mentee must harmonize their responsibilities. This harmony ensures an effective and productive mentoring process, with the desired goals being achieved and the transfer of knowledge and experience between the mentor and mentee continuing throughout the process.

Furthermore, the mentor and mentee must fulfill their roles and responsibilities because these duties contribute to a higher-quality, goal-oriented, and ethical mentoring process. Mentoring practices provide both the mentor and mentee with professional and personal development opportunities. These areas of development or functions are categorized as career and psychosocial functions. Finally, feedback is crucial in the mentoring process, and necessary precautions are taken to ensure that feedback is provided effectively and the process is evaluated.

Considering these processes, a general framework for designing, implementing, and evaluating remote mentoring practices for technology integration in higher education was developed and created, as shown in Figure 4.

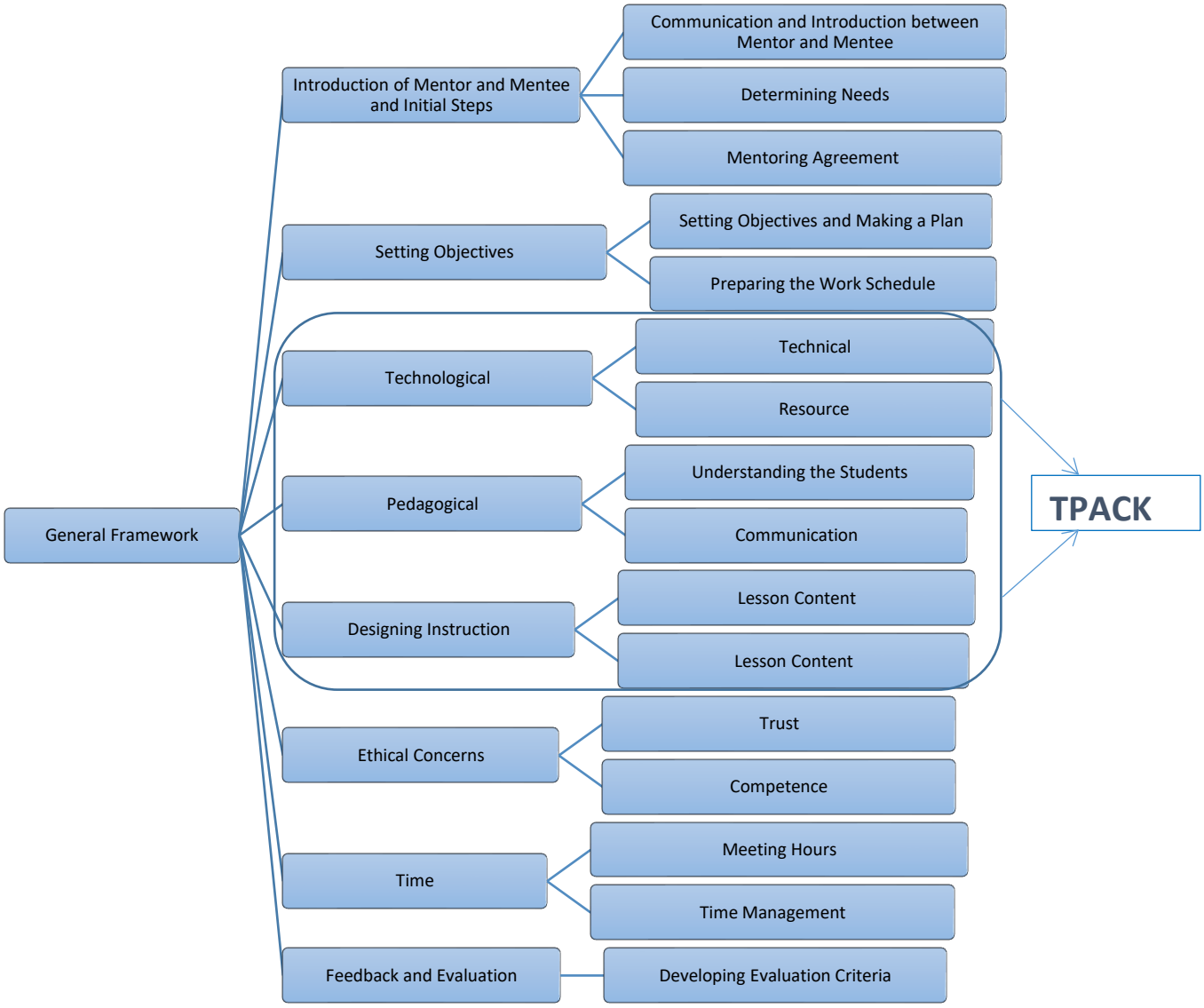

Figure 4. General Framework of the Mentoring Process Designed within the Study

The general framework depicted in Figure 3, created as part of the study, consists of eight sub-dimensions: mentor-mentee introduction and first steps, goal setting, the technological, pedagogical, and instructional design dimensions based on the TPACK framework, ethical concerns throughout the entire process, time management, and feedback-evaluation. Initially, the mentor contacted the mentee, and the introduction took place. The mentoring sessions began with the mentor identifying the technical and technological needs of the mentee, during which the mentor provided suggestions. With the mentee's consent, a mentoring contract was signed, and a work schedule was created based on the agreed-upon topics. Since the goal was to achieve technology integration, the TPACK framework was considered, integrating technological, pedagogical, and content knowledge into the work schedule. During the mentoring sessions, the mentor and mentee introduced technological resources weekly, and by following the mentee's Instructional Principles and Methods class, the mentor had the opportunity to observe and become familiar with the students, examining the process's impact on the mentee's lessons in terms of technology, pedagogy, and content. Throughout the process, in the dimension of ethical concerns, the mentor fulfilled their responsibilities toward the mentee, establishing a mutual trust. Efforts were made to adhere to the meeting schedules, ensuring attention to time management. The mentee provided feedback and evaluations to the students during the process, with assessments conducted using the scale from the work schedule in the first week.

Effects of Technology Integration-Focused Mentoring Practices on the Faculty Member's In-Class Teaching Practices

At this study stage, the mentor attended the mentee's remotely conducted Instructional Principles and Methods course for nine weeks, with observations for the four missed classes made through viewing the recorded lesson videos. The observations were noted on an observation form created by the mentor. Each week, if the observed behaviors were present, they were marked with an 'X'; if not, no mark was made. Additionally, throughout the 13 weeks, lesson observations were recorded in the mentor's reflections.

In the study, behaviors such as implementing the lesson plan, keeping students mentally engaged, guiding students in accessing information, allowing students time for responses and explanations, listening to them and providing feedback, using technological applications introduced during the mentoring process in class, employing different technological methods, and using both traditional and performance-based assessment tools were identified in the observation form created to investigate the effects of technology integration-focused mentoring on the faculty member's in-class teaching practices. These behaviors were observed over 13 weeks, and their occurrence frequency (the total number of weeks they were observed) and percentage (the percentage of weeks the behavior was observed out of 13) are presented in Table 2.

Table 2 . Observation Findings on the Effects of Technology Integration-Focused Mentoring Practices on the Faculty Member's In-Class Teaching Practices

Observed Behavior	Gözlem Haftası	Frekans (1-13 hafta)	Yüzde %
Implementing the lesson plan	W1, W 2, W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13	13	100
Keeping the student mentally active	W4, W5, W6, W7, W8, W9, W10, W11, W12, W13	10	76,92
Guiding the student in the process of accessing information	W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13	11	84,61
Allowing time for students to ask questions and explanations, actively listening and provide feedback	W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13	11	84,61
Using technological applications provided in the mentoring process during the lesson	W5, W6, W7, W8, W9, W10, W11, W12, W13	9	69,23
Using different technological methods	W5, W6, W7, W8, W9, W10, W11, W12, W13	9	69,23
Using traditional and performance-based measurement and evaulation tools together	W1, W2, W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13	13	100

(W= Week, for example W4= Observation related to Week 4)

According to Table 2; implementing the lesson plan, keeping the student mentally active, guiding the student in the process of accessing information, giving students time for answers and explanations, listening to them and giving feedback, using technological applications given during the mentoring process in the lesson, using different technological methods, traditional and performance-based assessments. While the lowest observation frequency of behaviors such as using assessment tools together was observed to be 9 in 13 weeks, behaviors such as implementing the lesson plan and using traditional and performance-based measurement-evaluation tools together were observed in all weeks.

The mentoring sessions and studies carried out with the mentor and mentee every week in accordance with the work schedule, observations of the effects of these studies on the mentee's Teaching Principles and Methods course, and the general evaluation of the process were recorded in the reflections kept by the mentor for 13 weeks.

In the study, for the first research question, which was to investigate the effects of technology integration-oriented mentoring practices on the faculty member's classroom teaching practices, weekly reflections were examined along with observations, and certain themes and categories were created from the reflections and the reflection weeks and frequencies were found as in Table 3.

Table 3. Observational Findings Regarding the Effects of Technology Integration-Focused Mentoring Applications on Classroom Teaching Practices

Theme	Category	Frequency (1-13 weeks)	Total
Effect of Technology Integration-Focused Mentoring on Classroom Teaching Practices	Providing suggestions for the use of technology by students	7	**71**
	Acting as a role model in using technology for students	6	
	Keeping students mentally active	10	
	Guiding students in accessing information	11	
	Using technological applications provided during mentoring in the lesson	9	
	Intervening in problems and difficulties encountered	13	
	Using different technological methods	9	

According to Table 3, eight categories were created under the theme of the effects of technology integration-focused mentoring on in-class teaching practices. The categories are as follows: providing students with suggestions on using technology, giving positive reinforcement to students who use appropriate digital materials in their presentations, being a role model for students in using technology, keeping students mentally engaged, guiding students in the process of accessing information, using the technological applications introduced during the mentoring process in the lessons, addressing problems and challenges encountered, and employing different technological methods.

Effects of Technology Integration-Focused Mentoring Practices on the Mentee's Technological Competencies

The study identified behaviors such as effectively using technology in the lesson, designing and selecting technology-based materials, and using digital materials and tools in the observation form created to investigate the effects of technology integration-focused mentoring on the mentee's technological competencies. These behaviors were observed, and the frequency (the total number of weeks they were observed) and percentages (the percentage of weeks the behavior was observed out of 13) were recorded, as shown in Table 4.

Table 4. Observation Findings on the Effects of Technology Integration-Focused Mentoring Practices on the Mentee's Technological Competencies

Observed Behavior	Observation Week	Frequency (1-13 weeks)	Percentage (%)
Effective use of technology in the lesson	W5, W6, W7, W8, W9, W10, W11, W12, W13	9	69.23
Designing and selecting technology-focused materials	W5, W6, W7, W8, W9, W10, W11, W12, W13	9	69.23
Using digital materials and tools	W6, W7, W8, W9, W10, W11, W12, W13	8	61.53

According to Table 4, the behaviors identified, such as effectively using technology in the lesson, designing and selecting technology-based materials, and using digital materials and tools, were generally observed starting from the fourth week of the mentoring process. The behaviors of effectively using technology in the lesson and designing and selecting technology-based materials were observed for nine weeks (69.23%) out of the 13 weeks, while using digital materials and tools was observed for eight weeks (61.53%).

The second research question, which aimed to investigate the effects of technology integration-focused mentoring practices on the mentee's technological competencies, was examined through weekly reflections and observations. Themes and categories were derived from the reflections, and their frequencies were determined, as shown in Table 5.

Table 5. Findings from Reflections on the Effects of Technology Integration-Focused Mentoring Practices on the Mentee's Technological Competencies

Theme	Category	Frequency (1-13 weeks)	Total
Effect of Technology Integration-Focused Mentoring on the Mentee's Technological Competencies	Applying the information obtained from mentoring sessions the following week	9	
	Performing technology-based tasks assigned by the mentor	6	
	Being able to implement the applications during mentoring sessions	6	
	Effective use of technology in the lesson	9	**47**
	Designing and selecting technology-focused materials	9	
	Using digital materials and tools	8	

According to Table 5, the analysis resulted in six categories under the theme of the effect of technology integration-focused mentoring on the mentee's technological competency. These categories include applying the knowledge gained from the mentoring sessions the following week, completing technology-based tasks assigned by the mentor, performing technological applications during the mentoring sessions, effectively using technology in the lesson, designing and selecting technology-based materials, and using digital materials and tools.

Effects of Mentoring Practices on Students

In the study, the observation form was created to investigate the effects of mentoring practices on students' identified behaviors, such as student groups incorporating the technological applications introduced during the mentoring process into their lesson presentations and emphasizing digital materials and tools. These behaviors were observed, and the weeks they were observed, along with their frequencies and percentages, are presented in Table 6.

Table 6. Observational Findings Regarding the Effects of Mentoring Applications on Students

Observed Behavior	Observation Week	Frequency	Percentage (%)
Use of applications given during mentoring by student groups presenting lessons in their lesson presentations	W8, W9, W10, W11, W12, W13	6	46.15
Drawing attention to the use of digital materials and tools	W6, W7, W8, W9, W10, W11, W12, W13	8	61.53

According to Table 6, the behaviors identified, such as student groups incorporating the technological applications introduced during the mentoring process into their lesson presentations and emphasizing digital materials and tools, generally started being observed from the sixth week of the mentoring process. Incorporating the technological applications introduced during the mentoring process into their lesson presentations were observed for six weeks (46.15%) while emphasizing the use of digital materials and tools was observed for eight weeks (61.53%) based on the observations.

The second research question, which aimed to investigate the effects of mentoring practices on students, was examined through weekly reflections and observations. Themes and categories were derived from the reflections, and their frequencies were determined, as shown in Table 7.

Table 7. Findings from Reflections on the Effects of Mentoring Practices on Students

Theme	Category	Frequency	Total
Effects of Mentoring Applications on Students	Emphasizing the use of technology in lesson presentations	7	27
	Correctly integrating technology	6	
	Use of applications provided during mentoring by student groups presenting lessons in their presentations	6	
	Use of digital materials and tools	8	

Based on the analysis of Table 7, four categories were created under the theme of the effects of mentoring practices on students: emphasizing the use of technology in lesson presentations, properly integrating technology, student groups incorporating the technological applications introduced during the mentoring process into their lesson presentations and using digital materials and tools.

Evaluation of Technology Integration-Focused Mentoring Practices by the Mentee (Findings from Semi-Structured Interviews)

Following the mentoring practices, this study conducted a semi-structured interview with the mentee to gather their views on various aspects. These included the effects of technology integration-focused mentoring practices on the mentee's in-class teaching practices (such as conducting student-centered lessons, applying different methods, classroom management, communicating with students, providing guidance, etc.), the effects on the mentee's technological competencies (such as effectively using technology in lessons, designing and selecting technology-based materials), the effects of mentoring practices on students, the impact of roles and role changes during the mentoring sessions, and challenges experienced during the mentoring process. The mentee's responses were analyzed, and themes, categories, and codes were created, as shown in Table 8.

Table 8. Mentee's Views on Technology Integration-Focused Mentoring Practices

Theme	Category	Code	Total	Code
Evaluation of mentoring practices focused on technology integration by the mentee	Effect of classroom applications	Establishing effective communication	4	
		Providing guidance		
		Conducting student-centered lessons		
		Using in other lessons		
	Effect of Technological Competencies	Being competent in technology	4	
		Using applications		
		Sharing ideas on selecting and designing materials		
		Using applications		
	Effect of mentoring applications on students	Integrating applications into students' presentations	5	
		Giving suggestions		
		Sharing worksheets		
		Being more active in class		
		Integrate them into their own fields		
	Effect on the change of roles between mentor and mentee	Mutual learning	5	
		Seeing progress		
		Involving students in the process		
		Moving from the role of mentee to the role of mentor		
		Being positively affected by change		
	Difficulties experienced during mentoring	Difficulty due to students not being able to adapt in the first weeks	2	
		Difficulty in conducting lessons remotely		

In the theme of the mentee's evaluation of technology integration-focused mentoring practices, five categories were created based on the mentee's responses through content analysis: the impact on in-class practices, technological competencies, students, roles and role changes during the mentoring process, and challenges faced during the mentoring process.

In the interview with the mentee, when asked, "What are the effects of technology integration-focused mentoring practices on your in-class teaching practices?" the mentee expressed:

"*I tried to apply the mentoring support I received, for example, the following week. Even if I cannot apply some very effectively now, I can apply them in more suitable lessons next year. For instance, I tried using ChatterPix, but I will use it in a Science course I teach next year. I try to conduct my in-class practices student-centered, even though this semester has been greatly affected… It has also been effective in communication, allowing students to open their microphones and speak or write as they wish. I ask questions, and as you know, the student groups assigned in the Instructional Principles and Methods course present each week. We also suggested that they integrate technology into their presentations. The worksheets we sent them had an impact, of course.*"

Based on this response, it was determined that the mentee established effective communication with students, guided them, conducted student-centered lessons, and intended to use the practices in other lessons. Four codes were created based on these responses.

In the interview, when asked, "What are the effects of technology integration-focused mentoring practices on your technological competencies (e.g., effectively using technology in your lessons, designing and selecting technology-based materials)?" the mentee responded:

"I believe our weekly mentoring sessions had an impact on my technological competencies. For example, I had ideas about augmented reality applications before, but I could not put them into practice. Thanks to mentoring, I started to develop ideas about designing and selecting technology-based materials. I am also grateful for the work schedule we created together because the process progressed according to my needs, which made me happy. These were the applications I especially wanted to use in my lessons."

Based on this response, it was determined that mentoring practices positively impacted the mentee's technological competencies, enabled them to implement applications, and helped them form ideas about material selection and design. Four codes were created based on these responses.

When asked, "What are the effects of mentoring practices on your students?" the mentee replied:

"As you know, I conduct the Instructional Principles and Methods course first, and then the class continues with student presentations. First, I will try to implement the technological applications we discussed in our mentoring sessions. As you have seen in the lessons, we suggest that students integrate these applications into their presentations. Sharing the worksheets with them was effective in this process. We observed together that they improved each week. The first groups were only doing passive PowerPoint presentations, but as the weeks progressed, they added applications like video, ChatterPix, and Canva to their presentations. It made us happy that they were more active in class and could integrate these applications into their subject areas."

Based on this response, five codes were created, including integrating applications into student presentations, giving suggestions, sharing worksheets, being more active in class, and integrating them into their fields.

When asked, "What are the effects of roles and role changes during the mentoring sessions?" the mentee stated:

"As we mentioned at the beginning of the process, we said there were many things we could learn from each other. Moreover, yes, that is exactly what happened. Today, I can see our progress thanks to our weekly mentoring sessions. I was the mentee when it came to technology integration. However, sharing my experiences with my students, encouraging them, and including them in the process was almost like transitioning from the role of a mentee to that of a mentor. At this point, I was positively affected by this change. One of the best ways to learn something is to explain it to others."

This response created five codes, including mutual learning, seeing progress, involving students in the process, transitioning from the mentee to the mentor role, and being positively affected by this change.

When asked, "Did you experience any difficulties during the mentoring process? If so, what were they?" the mentee answered:

"We did face some challenges; for example, the students struggled to adapt in the first weeks. You will remember that they only did PowerPoint presentations in the first weeks. However, as time went on, they began to adjust. Also, mentoring remotely was a bit of a challenge... However, aside from that, I did not encounter any major difficulties. We ended up using technology more because of the circumstances. If it had been face-to-face, we might not have used it as much."

Based on this response, two codes were created: students' initial difficulty adapting and the challenge of mentoring remotely.

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

This study aimed to support the development of higher education instructors who implement student-centered learning approaches by providing mentoring support for technology integration. It also examined the effects of these implementations on both the instructor and the pre-service teachers taking their classes and their applicability. The features and content of the mentoring sessions conducted within the scope of the study were designed and implemented based on the actual needs of the mentee and their acceptance of these needs. The technological support applications required by the mentee were identified, and a general mentoring framework was created accordingly. The TPACK framework was mainly considered during the study's implementation phase. The TPACK framework is important because it pioneers the integration of technology into education, provides guidance, and provides information on how to use technology in the best and most efficient way in the learning process. This framework also provides a general overview of the mentoring process from the first stage to the end. It is believed that the framework created within the scope of this study will serve as an example for researchers working on mentoring regarding process management.

According to the results of weekly reflections, semi-structured interviews, and lesson observation forms regarding the first research question of the study – the effects of technology integration-focused mentoring practices on the classroom teaching practices of the instructor (such as conducting student-centered lessons, applying various technological methods, managing the

classroom, communicating with students, providing guidance, addressing problems and challenges, etc.) – it was found that the classroom teaching practices were positively impacted. The instructor implemented such practices in 10 of the 13 weeks, made suggestions to students on integrating them into their presentations, acted as a guide during students' information-seeking process, faced some challenges and the shift to remote education but overcame them over time, and encountered no issues with communication and guidance. The instructor's reinforcement of students who used appropriate digital materials in their presentations and their role-modeling in technology use also positively impacted classroom practices.

In line with Bierema and Meriam (2002), Sockett (1993), Hobson and Maldenez (2010), who found that mentoring practices benefit mentees' professional development, self-assessment, and classroom management, Yost (2002) stated that mentoring practices help instructors meet their needs and develop themselves, which in turn reflects positively on classroom practices and contributes to their student's academic success.

The findings related to the second research question of the study – the effects of technology integration-focused mentoring practices on the technology competencies of the mentee (e.g., effective use of technology in the classroom, designing or selecting technology-focused materials) – indicate that the mentee was able to implement the information gained from mentoring sessions the following week, completed technology-based tasks assigned by the mentor, and showed an inclination towards designing and selecting technology-focused materials during mentoring sessions. Although the mentee did not actively use technology in the first three weeks, the mentee and the students actively used it in the following weeks, paying attention to digital materials and tools.

Considering the efforts made to integrate technology into lesson activities through mentoring sessions and the mentee's dedication to conducting lessons in this manner, it is believed that a diligent process was carried out. Brockbank and McGill (2006) highlighted the importance of mentoring in promoting the mentee's development when assessing this development process. Moreover, Bakioğlu (2015), Clutterbuck (2014), Rowley (1999), and Kahraman (2012) emphasized the importance of qualities such as eagerness to learn, openness to feedback, and planning for mentees. Based on this, it is considered that the mentee had a successful process alongside the mentoring sessions.

Regarding the third research question of the study – the effects of mentoring practices on students – it was observed that after the seventh week, student groups delivering lessons began using the applications provided during the mentoring process in their teaching, the mentee encouraged students to integrate these technological applications into their presentations, and students were more active in class compared to the initial weeks, integrating the applications into their subject areas. Technology integration into student presentations made both the mentee and the mentor happy, and the importance of proper technology integration, rather than merely adding technology, was emphasized during lessons.

Mentoring sessions were designed to support the mentee's transition from traditional teaching activities to student-centered, technology-focused teaching activities in accordance with curriculum requirements. At this point, it was crucial for both the mentee and mentor to fulfill their roles and responsibilities.

According to the semi-structured interview with the mentee regarding the fourth research question of the study – how the mentee evaluated the technology integration-focused mentoring practices – the mentee found the mentoring practices very useful despite the challenges posed. They tried to implement remote mentoring with the mentor and deemed it productive. The mentee also mentioned that both parties learned a lot from each other during the mentoring sessions. After a certain period, when the mentee encouraged their students to integrate these practices into their presentations, they felt they had transitioned from the mentee to the mentor role. The mentee did not face many difficulties during the mentoring practices, except for the challenges posed by remote mentoring and the initial weeks when students had trouble adapting to the process. Reflection and observation results also supported this. For example, it was observed that students did not use technology much in their presentations during the initial weeks. However, in the later weeks, the mentee's active use of technology in the lessons and their suggestions for students to integrate technology into their presentations, along with positive reinforcement from the mentee and other students, showed improvement in technology integration in their presentations.

In this study, special attention was given to developing and using different materials suitable for the individual activities and characteristics of the mentee's students, who were either teacher candidates or teachers (since there were students from other disciplines in this group), supporting teachers in becoming aware of their performance and taking necessary measures accordingly. By enhancing the individual evaluation and control skills of teachers with different characteristics and classroom practices, teachers were encouraged to adapt the example activities provided in the education system to their disciplines and to adopt a problem-solving approach. For example, while science teachers used augmented reality applications for the circulatory system, mathematics teachers preferred them for explaining three-dimensional shapes.

In this study, the necessary information for developing teachers' professional competencies (technology-focused education) was not provided as mere factual knowledge. Instead, teachers were allowed to conduct the required activities (such as interactive short seminars and one-on-one mentoring support) in the presence of a mentor. This support helped the mentee

gain experience preparing such activities (incredibly instructional materials) by actively engaging in the process rather than simply accepting and storing theoretical information about the needed skills. Additionally, the mentee benefited from transferring the experiences gained to their students, thus reaching a wider audience within the scope of the study.

The results of this study parallel those of other research in many respects. Şahinoğlu (2020) evaluated mentoring practices aimed at improving physics teachers' adaptation to the revised curriculum and found that mentoring contributed to both academic and professional development. Needs analyses revealed that teachers tended to adopt more teacher-centered approaches. Alongside the practices, improvements were observed in classroom activities (greeting, motivation, and drawing attention), preparing in-class materials and activities, the didactic structures of their lessons, and student-centered approaches. Moreover, the academic success of students in observed classrooms increased. Mentoring support was found to contribute to the development of teachers. Similarly, Kahraman (2012) investigated the impact of e-mentoring on the professional development of pre-service information technology teachers and found that e-mentoring positively impacted their professional development alongside formal education. The e-mentoring program also facilitated knowledge and experience sharing among students, academics, and graduates, helping to develop social networks. These studies show similarities to this study, supporting the idea that mentoring practices have a positive impact.

Based on the results of this study, which investigated the effects of providing mentoring support for technology integration to higher education instructors and its impact on both the instructor and pre-service teachers taking their classes, as well as the mentor's experiences, the following recommendations are made:

- In this study, reverse mentoring was conducted remotely. Researching the suitability of different mentoring approaches (group, self, one-on-one) for the conditions in our country would support the technology integration process for instructors.

The application of remote mentoring practices to different working groups (such as the training of education administrators, candidates, or formator teachers) would contribute to the effectiveness of studies in these areas.

- Organizing programs and events for instructors who have completed mentoring practices to share their experiences and achievements with their colleagues would enhance the widespread impact of the technology integration process and contribute to the usability of mentoring practices.

- Observing all of the instructor’s lessons, rather than just one or two, during mentoring practices, would allow for a more in-depth needs analysis and result in differentiated mentoring practices that would further support the instructor’s development in technology integration.

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I hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

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