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AN EXAMINATION OF TEACHERS' PRACTICES SUPPORTED THROUGH MENTORING PROGRAM

The aim of this study is to investigate the impact of mentoring practices designed to support the implementation of the updated physics curriculum on teacher practices. To achieve this objective, a three-stage model utilizing a group mentoring approach was developed, consisting of Preparation (need assessment to identify current teacher status), Realization (mentoring practices addressing identified gaps in subject knowledge), and General Evaluation (assessment of the impact of mentoring practices on teacher practices before, during, and after the implementation process). The didactic engineering method was adopted, and three physics teachers were observed over a 16-week period using camera recordings. The observations were categorized according to physics-specific competencies, and the teachers' practices were analyzed accordingly. The findings indicate that the mentoring support had a positive impact on the teachers' development of didactic structure and student-centered approaches, with some regression observed after the cessation of mentoring. However, teachers' practices remained improved compared to their initial state. This study was limited to three volunteer physics teachers, but the results suggest that mentoring practices can be more effective in improving teachers' compliance with the curriculum in applied teacher education, and the study has practical implications for teacher training and professional development. The study contributes to the field by providing a different perspective on teacher training, emphasizing practical training and needs assessment over theoretical education.

***Keywords**: mentoring, mentoring program, teacher practices, teacher training.*

INTRODUCTION

The vital role of teachers in the education system cannot be overstated, as they directly impact the quality of education and the qualifications of students. To ensure the delivery of high-quality education, it is imperative that in-service teachers assimilate the curriculum's prerequisites and keep abreast of technological advancements in the field of education (Akdeniz and Paliç, 2012; Can, 2004; Kuloğlu and Akpınar, 2016). The curriculum plays a crucial role in facilitating the implementation of novel pedagogical practices and advancements in education, as well as providing guidance on effective methods for instructing course content (Demirel, 2012; Koyuncu, 2014). The primary determinant of curriculum success is the extent to which teachers possess the qualifications stipulated by the curriculum and embrace its tenets (Aktaş-Cansız, 2013; Alismail and McGuire, 2015; Alsubaie, 2016; Gömleksiz and Kan, 2007; Karacaoğlu and Acar, 2010; Li and Chen, 2017; Sentance and

Csizmadia, 2016). Research conducted by Bezen et al. (2016) and Çepni et al. (2014) indicate that one of the primary reasons for the challenges in implementing a curriculum is the reluctance of teachers to abandon traditional teaching methods and practices. Horasan et al. (2013) indicate that inadequate in-service training support is a significant reason for teachers' insufficient knowledge about the philosophy, content, and implementation of the curriculum, resulting in an inability to implement the curriculum as expected.

As commonly acknowledged, adequate expertise and proficiencies of teachers regarding program implementation is imperative, necessitating the persistent advancement of teachers' professional skills (Engelbrecht and Ankiewicz, 2016; Geldenhuys and Oosthuizen, 2015). In-service training is widely employed as a means to educate teachers about new concepts, subjects, and technological advancements in education, as well as to impart novel pedagogical approaches, thereby promoting their ongoing professional development (Tzivinikou, 2015; Vu et al., 2015). The nature of the work condition training services provided for in-service teacher training in Turkey and their effects have been the subject of several investigations. In the investigations conducted by some researches (Ayvacı et al. 2014, Cemaloğlu et al. 2018, Çetin, 2019, Kaya, 2017, Kubat, 2017, Özavcı and Çelikten, 2017 and Yılmaz and Gökçek, 2016), it has been emphasized that in-service training programs for teachers in Turkey are not tailored to their individual needs, lack practical applications, train too many teachers at the same time, suffer from time constraints, face teacher unwillingness to attend, and experience a shortage of qualified trainers (Ahmed et al., 2015; Issaka, 2018; Osamwonyi, 2016).

The influence of technological and scientific advancements, as well as innovations in education, are integrated into educational programs, which play a crucial role in shaping the physics curriculum and other basic sciences. Notably, the shift towards a constructivist approach rather than a behavioural approach in Turkey since 2007 has been highlighted in studies such as Gömleksiz and Kan (2007) and the Ministry of National Education (MEB) (2007). The adoption of a constructivist approach in the physics curriculum in Turkey since 2007 has enabled students to gain a better understanding of theoretical and practical aspects of physics concepts. This approach has been shown to help students approach problems more clearly, as supported by studies such as Marshall and Case (2010), Seung et al. (2012), and Yates and Millar (2016). The physics curriculum is designed to foster individuals who exhibit curiosity, creativity, critical thinking skills, and take responsibility for their own learning, and to assist students in utilizing what they learn in school to solve problems in their daily lives (Akdeniz and Paliç, 2012; Çepni and Özmen, 2011; Koyuncu, 2014). The physics curriculum underwent a simplification of content while retaining its philosophical and learning approach in 2013, according to Karadayı et al. (2013), MEB (2013) and Şengören et al. (2015). The 2013 physics curriculum aimed to foster individuals who would question physics in everyday life, utilize scientific process skills and possess problem-solving skills, as reported by Bayrak et al. (2015), Kuloğlu and Akpınar (2016), and MEB (2013). In constructivist teaching programs, the primary responsibility of the teacher is to guide students, create a learner-centred classroom environment, and facilitate knowledge construction by students, as asserted by Akpınar and Aydın (2010). As opposed to the mere transfer of information, the constructivist approach aims to cultivate skills for solving real-life problem situations encountered by students, according to Alt (2015), Bada (2015), Çiftçi et al. (2013), Khalid and Azeem (2012), and other researchers. Researchers also highlight the characteristics that define a constructivist teacher, such as being contemporary, self-renewing, learning collaboratively with students, engaging in dialogue with students in the learning environment, listening to students' responses, allowing students to correct mistakes, taking into account students' pre-existing knowledge about the concepts being taught, offering students new experiences, curriculum-centered learning, fostering intellectual discussions, emphasizing

collaborative group work, and designing appropriate learning environments, according to Amineh and Asl (2015), Fernando and Marikar (2017), Fidan and Duman (2014), Murphy and Gash (2020), and Taylor (2015). The constructivist teacher should also encourage students to create scientific discussion environments, think critically, utilize analysis and synthesis skills, and aid in accessing information, according to Aina (2017), Evrekli et al. (2009), Han et al. Ko (2017), Lemke (2014), and McComas (2014).

It is well-established that the success of a well-designed curriculum is largely dependent on how effectively it is implemented by teachers in the classroom (Sumual and Ali, 2017; Yulianti, 2015). However, research has shown that many teachers still rely on traditional teaching methods, despite the constructivist approach advocated by the curriculum (Aksu, 2014; El-Deghaidy et al., 2015; Habok and Nagy, 2016; Ocak et al., 2012; Rangel et al., 2015; Taha et al., 2015). This situation can be attributed to a lack of adequate infrastructure among teachers (Aydın et al., 2018; Ayvacı et al., 2012), inadequate training seminars which fail to address the content effectively (Bozkurt and Aslanargun, 2015; Demir and Demir, 2012; Üce and Sarıçayır, 2013; Yadigaroğlu and Demircioğlu, 2012), and teachers' resistance to adopting the constructivist learning philosophy that underpins the curriculum (Aksu, 2014; Çiftçi et al., 2013). In studies conducted on the physics curriculum, it is also apparent that the reluctance of teachers to abandon traditional methods and habits is a significant obstacle to the successful implementation of the curriculum (Bezen et al., 2016; Çepni et al., 2014; Kotluk and Yayla, 2016).

In recent years, mentoring practices have been increasingly used in our country as an alternative to in-service training, which is frequently criticized for introducing innovations in education, such as education programs, measurement-evaluation, and technological innovations (Sağlam-Arslan et al., 2016; Sağlam-Arslan et al., 2017; Sezgin et al., 2014; Şahinoğlu and Sağlam-Arslan, 2019; Şahinoğlu, 2020). In several countries, where teacher satisfaction and continuous development are prioritized (such as Spain, England, Sweden, Japan, South Africa, Norway, Canada, Singapore, Finland, and the USA), mentoring practices have been widely implemented, and have resulted in significant successes in the continuous education of teachers (Yirci and Kocabaş, 2012). Several researchers (Allen et al., 2006; Bierema and Meriam, 2002; Kuzu et al., 2012; Şahinoğlu and Sağlam-Arslan, 2019) have shown the positive effects of mentoring on teachers' professional and personal development, and emphasize its importance. The main purpose of mentoring is to facilitate the learning and development of the mentee, while enabling them to quickly adapt to their individual needs with the support of a more experienced, senior, and knowledgeable mentor, thus completing their professional and personal development. Trust, empathy, and mutual understanding are frequently emphasized during the mentoring process (Karadağ, 2015; Özdemir and Boydak-Özan, 2013; Rhodes et al., 2004). The utilization of mentoring practices is acknowledged to be beneficial in supporting newly appointed teachers in education, aiding their adjustment to their role, and facilitating school administrators in addressing issues and achieving modernization (Bakioğlu, 2015; Yirci and Kocabaş, 2012).

The studies conducted on teaching programs (Akdeniz and Paliç, 2012; Alismail and McGuire, 2015; Alsubaie, 2016; Aktaş-Cailmez, 2013; Griffin, 2018; Gömleksiz and Kan, 2007; Karacaoğlu and Acar, 2010; Khan and Law, 2015; Kuloğlu and Akpınar, 2016; Li and Chen, 2017; Null, 2016; O'Neill, 2015; Sentance and Csizmadia, 2016) highlight the importance of both the theoretical curriculum (curriculum designed by curriculum developers) and the real curriculum (curriculum put into practice by teachers).

However, the discrepancy between these two curricula has created a chaotic situation in the field of education. Therefore, the purpose of this study is to introduce a curriculum that is developed based on contemporary approaches and applied in classroom settings. Additionally, the study aims to provide mentoring support to the teachers, who are the

practitioners of the curriculum, and to analyze the effects of this support on their professional development.

METHODOLOGY

Research Model. This study adopts a didactical engineering research model which is deemed suitable for its nature. Didactical engineering is believed to provide a balanced approach by considering both theoretical and applied information (Arslan and Sağlam-Arslan, 2016). It also assists in the implementation of a theoretically designed structure in the classroom and contributes to its development (Artigue, as cited in 1988, Arslan and Sağlam-Arslan, 2016). The researcher has the ability to intervene in the learning environment within this research model. This means that the researcher can reconstruct the learning environment by using teaching practices that emerge during the application process and eliminate any deficiencies (Kurnaz and Sağlam Arslan, 2011). Therefore, selecting didactical engineering is crucial in focusing on the development of teachers in classroom practices in this study.

Process of Mentoring Practice. In this study, a group mentoring approach was used to facilitate the sharing of best practices among teachers, and a mentoring model was developed and implemented to support this approach. The created mentoring model is specified in Table 1 below.

Table 1

Mentoring model

Phase	Content
Preparation	Needs analysis, giving and receiving feedback, determining goals and expectations
Realization	Designing/planning lessons, realizing lessons and observing applications, discussing and evaluating applications, performing developmental analysis
General Evaluation	Making continuity analysis

Developed by authors

The mentoring model used in this study consisted of three phases. In the preparatory phase, the teachers' lessons were observed to determine their needs, and these needs were shared with the teachers. In the second stage, called the realization phase, mentoring support was provided based on these needs. The support practices included interactive discussions for specific needs, designing individual learning activities, creating a scientific discussion environment, preparing and evaluating course plans and materials, and creating lesson plans. The mentors observed the in-class applications of the lessons prepared by the teachers and discussed their practices in the next mentoring session based on the results of the course observations. In the final stage, called the general evaluation stage, the lessons were observed without any support, and the continuity of the teacher practices developed during the realization phase was examined.

The first stage of the mentoring model involved conducting a four-week course observation without any disruption to the teaching environment in order to identify areas where the teachers required additional support. The second stage, referred to as the realization phase, spanned over a duration of eight weeks, during which the teachers were provided with mentoring assistance on a variety of topics that corresponded to their specific needs. The support provided included assistance with planning and carrying out weekly lessons, as well as mini-seminars with active participation on subjects such as attention and motivation, individualized and differentiated teaching practices, learning styles and teaching, using materials in teaching, preparing interrogative learning environments, process assessment

approach and learning, and complementary (alternative) assessment methods and their effects on learning. Finally, the continuity analysis phase entailed a four-week observation period, in which the teachers' lessons were evaluated without any interference with the teaching environment to assess the sustainability of the behaviour changes that occurred during the realization phase.

Participants. The study focused on three physics teachers (PT) who volunteered to participate in the mentoring practices. This was due to the nature of the mentoring practices, which required a lengthy application period and consistent, selfless effort from the participants. Demographic information of teachers is given in Table 2 below.

Table 2

Demographic features of participants

Teachers	Professional Experience (Year)	Age	Gender	Class Examined in The Study	Number of Students
PT1	12	35	M	10^{th}	32
PT2	13	35	M	10^{th}	20
PT3	23	47	M	9^{th}	34

Developed by authors

Data Collection. In this study, the lessons of all participating teachers were recorded by video recording for a total of 16 weeks, which included 4 weeks before mentoring practices, 8 weeks during mentoring practices, and 4 weeks after mentoring practices. The table 3 below summarizes the lesson observation times accompanied by teacher-oriented video recording.

Table 3

Duration of observed courses of participants

Teachers	Before Application (Needs Analysis)	During the Application (Realization)	After Application (Continuity)	Total
PT1	8	16	8	32
PT2	8	14	8	30
PT3	8	16	8	32

Developed by authors

A total of 94-course hours (a course hour is forty minutes) of the teachers participating in the study were observed with video recording and all were transcribed by the researcher who carried out the observation.

Data Analysis. The data analysis conducted to determine the effects of the mentoring model put into practice within the scope of this study on the classroom practices of teachers is designed as follows:

Step 1: The mentoring model used in this study considered needs analysis as the starting point of mentoring practices. As a result, the lessons conducted by participant teachers were observed via video recording in their natural environment without interference. The observation notes were transcribed and draft themes and codes were created. The final version of these themes and codes was developed with input from three experts.

Step 2: Based on the themes and codes determined in step 1, the observation notes of the lessons conducted by the teachers were re-read and categorized into four groups:

«activities that should definitely be improved», «activities proposed to be developed», «advanced level activities», and «overused activities».

Step 3: The missing practices identified in the needs assessment (i.e., «activities that should definitely be improved», «activities proposed to be developed», and «required overused activities») were the focus of the analysis. These practices were classified as «definitely developed» if they were not performed or rarely performed in an ideal classroom environment, and «proposed» if they were occasionally carried out.

Step 4: The observation notes (transcripts) of the teachers during and after mentoring practices were analyzed based on the classifications determined in steps 2 and 3. These analyses helped to determine how the mentoring practices carried out during the study impacted the practices of the participant teachers, in the context of the needs identified before mentoring practices.

Qualification in Research. The present study aimed to ensure the credibility and transferability of the research, as recommended by Miles and Huberman (1994) and Yıldırım and Şimşek (2011). To achieve credibility, long-term course observations of the participant teachers were conducted within the mentoring model, with the researcher adopting a neutral observer role throughout the process. In terms of transferability, the steps of the model and the working group were clearly described to facilitate replication and adaptation by other researchers. Moreover, ethical considerations were carefully addressed, including voluntary participation of the participants, informed consent, privacy protection of the participants' identities and data at all stages of the study, and confidentiality between the participants and the researcher.

FINDINGS

In this section of the study, the results obtained from the analyses are presented in terms of the individual development of the teachers. The distribution of the competencies related to the practices included in the introduction to course activities (Theme A), the didactic structure of the course (Theme B), student-centred approaches (Theme C), and assessment-evaluation activities (Theme D) varied among each teacher throughout the application.

Developmental analysis regarding the theme of teachers' introduction to course activities. Table 4 summarizes the developments of PT1, PT2, and PT3 in line with the needs determined before mentoring regarding the theme of the course introduction activities.

Table 4

Change of teachers' competencies related to the theme of the course introduction activities

Classifications	Codes	Before Mentoring	During Mentoring	After Mentoring
Activities that definitely need improvement	A1: Greeting, entering to class	PT1	–	PT2
	A2: Asking prior information	PT1, PT2	PT2	PT1, PT2
	A3: Attract attention	PT1, PT2	–	PT1, PT3
	A4: Motivate	PT1, PT2	PT1, PT2	PT1, PT2, PT3
	A5: Informing the aims	PT2	–	PT1
Activities proposed to be developed	A1: Greeting, entering to class	PT2, PT3	–	PT1
	A2: Asking prior information	PT3	PT1	PT3
	A3: Attract attention	PT3	PT1, PT2, PT3	PT2
	A4: Motivate	PT3	PT3	
	A5: Informing the aims	PT1, PT3	PT1, PT2, PT3	PT2, PT3

Prior to the implementation of mentoring practices, the needs of teachers were identified through classroom observations to determine areas in need of improvement. These needs were classified into activities that required improvement and activities that should be developed. The analysis of course observations for need assessment in Table 4 revealed that teachers PT1 and PT2 needed to improve their practices in asking for prior information, reminding (A–2), attracting attention (A–3), and motivation (A–4). PT2 and PT3 were identified as needing development in the practices of greeting and class introduction (A–1), while PT1 and PT3 needed improvement in informing the aim (A–5). Table IV also indicated that all teachers needed to improve their practices within the course introduction activities. During the mentoring sessions, it was found that all teachers showed improvement in salutation and classroom entrance practices, as they developed themselves in line with the identified needs. Furthermore, Table 4 showed that the attention and motivation practices of teachers were identified as areas in need of improvement, as these practices were not commonly performed before the implementation of mentoring practices. However, with the implementation of mentoring practices, it was found that the teachers had improved their practices, although they had not yet reached the required level. While PT1 did not pay attention to the behaviours related to greeting and entrance to the class before mentoring, it was determined that PT1 included the introductory sentences as follows in the lessons it conducts during mentoring practices:

PT1: (He comes to class. All students stand up) Good morning, friends.
Class: Thank you.
PT1: What is going on?

It was found that PT1, who did not pay much attention to the practice of drawing attention before mentoring, developed himself in this practice during mentoring and asked students about the history and the beginning of the subject regarding the practice of drawing attention. Also, quotations from PT1's mentoring lessons about this practice are given below:

PT1: Guys, have you heard of Archimedes?
Students: Yes… Yes, we had heard.
PT1: You know that? Was it Italian?
Students: No, it was anything.

It was determined that PT1 did not pay much attention to the motivation practice before mentoring, but during the mentoring, the students developed themselves in this field by making comments on their current situation in the motivation. Regarding the motivation practice, the quotation of PT1 from mentoring courses is given below:

PT1: Guys, we made a note entry late last night. By the way, I made an inference as to how true, how wrong, but tell your opinion. As if the first exams did not pay much attention, they created a little more comfort compared to the 1st exams.

In Table 4, PT2 also developed the practice of drawing attention that it did not do before mentoring during mentoring, and it was determined that the scientist on the subject concerned offered sections of his life. The excerpt from the mentoring lessons about PT2's practice of drawing attention is given below:

PT2: Archimedes, you know, is a famous scientist and has worked in many disciplines. Archimedes, one of these studies, is associated with buoyancy. It also revealed

the concept of buoyant force (establishing eye contact with some students, waiting a little bit, and continuing). In the years when Archimedes lived, he was the king of his own country.

In Table 4, while PT3 did not pay attention to the behaviours related to greeting and entering the class before mentoring, it was determined that PT3 included the introductory sentences as follows in the lessons it conducted during mentoring practices:

PT3: Friends, good morning.
Students: Thank you.
PT3: How are you?
PT3: We're fine, teacher.

In Table 4, PT3's preliminary information gives little space to the practice of asking-reminding before mentoring, while it is determined that it gives more place to the students at the beginning of the lesson during the mentoring practices by asking questions about past subjects. Excerpts from the lessons during the mentoring about PT3's preliminary information asking-reminding practice are given below:

PT3: Yes, let's remember what we did in our lesson yesterday…
S1: We inflated the balloon with a calcium tablet.
PT3: We put the calcium tablets into the test tubes and taped the balloons and we saw that the gas coming out of the calcium tablet inflates the balloons. What should we say from here? What properties have we mentioned gases? (He promises a student)
S2: We said that gases can take shape easily. When we tighten the balloon, we can shape it. We said that there are gaps between its particles.
PT3: That is gas… The attraction force between the forming particles is less than that of solids and liquids.

Developmental analysis of teachers' didactic structure of the course. The table 5 summarizes the development of PT1, PT2, and PT3 in line with the needs determined before mentoring regarding the theme of B.

Table 5

Change of Teachers' Competencies Related to the Didactic Structure of the Course

Classifications	Codes	Before Mentoring	During Mentoring	After Mentoring
Activities that definitely need improvement	B1: Making scientific discussions	PT1, PT2, PT3	PT1, PT2, PT3	PT1, PT2, PT3
	B2: Encouraging students to take effective notes in the course	PT1, PT2, PT3	PT2, PT3	PT1, PT2, PT3
	B4: Creating a deliberate, scientific discussion environment	PT1, PT2, PT3	PT2, PT3	PT1, PT2, PT3
	B5: Collecting the main themes of the course making explanations	PT1, PT2 PT3		PT1
	B6: Using different display formats	PT3		
	B7: Using teaching materials and equipment	PT3		PT3
	B8: Dictating the course content	PT1, PT2	PT1, PT2	PT2
	B10: Asking questions with short answers	PT2		

	B11: Short repetitions at the end of the lesson	PT2, PT3		PT2, PT3
	B12: Linking topics or concepts	PT2, PT3	PT2	PT2
	B13: Asking the learning at the end of the lesson	PT1, PT2	PT2	PT1, PT2
	B14: Examples from daily life	PT1, PT2, PT3	PT1, PT2	PT1, PT2, PT3
	B15: Informing the content of the next lesson	PT1, PT2, PT3	PT2	PT1, PT2, PT3
Activities proposed to be developed	B–2		PT1	
	B3: Making instructional explanations on the spot	PT2		
	B–4		PT1	
	B–5		PT1, PT2, PT3	PT2, PT3
	B–6	PT1, PT2		PT3
	B–7	PT1, PT2	PT1, PT3	PT1
	B–8		PT3	PT1
	B9: Writing the information on the material used in the lesson	PT2	PT1, PT2	
	B–10	PT1	PT1	PT2
	B–11	PT1	PT1, PT2, PT3	PT1
	B–12	PT1	PT1, PT3	PT1, PT3
	B–13	PT3	PT1, PT3	PT3
	B–14		PT3	
	B–15		PT1, PT3	
Overused activities	B–3	PT3		PT2, PT3
	B–9			PT1
	B–10			PT3

Developed by authors

Prior to the implementation of mentoring practices, the needs of all three teachers were determined through course observations and were classified into activities that required improvement and activities that should be developed more intensively. In Table 5, it was determined that all three teachers needed to improve their practices in scientific discussions (B–1), encouraging effective note-taking (B–2), creating a deliberate scientific discussion environment (B–4), collecting the main themes of the course to explain them (B–5), giving examples from daily life (B–14), and informing students about the content of the next lesson (B–15). The practices that PT1 and PT2 needed to develop were sharing teacher dictation content (B–8) and asking for student learning at the end of the lesson (B–13), while the practices that PT2 and PT3 needed to improve were short repetitions at the end of the lesson (B–11) and linking topics or concepts (B–12). Before the mentoring practices, PT1 and PT2 needed to develop practices of using different display formats (B–6) and teaching materials and equipment (B–7).

Table 5 shows that prior to the implementation of mentoring practices, PT1 engaged in instructional explanations on the spot (B–3), PT3 utilized dictation of course content (B–8) and asked questions with brief answers (B–10), and both PT1 and PT3 incorporated advanced-level writing regarding course material (B–9) in their teaching practices. However, it was determined that all teachers required improvement in practices beyond these. Notably, PT1 demonstrated sustained improvement in on-the-spot instructional explanations (B–3), while PT1 and PT2 made progress in using diverse display formats (B–6). Prior to mentoring,

the teachers did not prioritize the use of diverse display formats (B–6), but this was emphasized during mentoring sessions. Through the mentoring process, PT1, who had not previously placed much emphasis on the use of diverse display formats (B–6), improved in this area and arrived at mentoring sessions with materials aligned with the plan he had prepared. A quote of this practice from the mentoring lessons of PT1 is given below:

PT1: We tie two balloons to the device with insulating threads. This is what we call the assembly (showing the assembly on the table) beautifully.

In Table 5, it was found that before the mentoring sessions, PT2 did not give sufficient consideration to the practice of utilizing diverse display formats (B–6). However, PT2 demonstrated progress in this area during the mentoring process and arrived at mentoring sessions with materials he had previously prepared for his lessons. An excerpt of this practice from the mentoring lessons of PT2 is given below:

PT2: Okay, let's give it an example (referring to the different cross-sections in the injector).

Table 5 indicates that PT2 was the only teacher who demonstrated improvement during the mentoring process and was able to sustain this improvement in the practice of utilizing teaching materials and equipment (B–7), an area that all teachers needed to develop prior to mentoring. Specifically, during mentoring sessions, PT2 utilized simulations in the online environment to enhance this skill, despite having previously given little attention to it. An excerpt from the mentoring lesson related to this practice is provided below:

PT2: Meanwhile, I'm opening an electrical simulation on the internet from Phet Colorado.

Table V reveals that prior to mentoring, PT3 did not prioritize the use of diverse display formats (B–6). However, during mentoring sessions, PT3 arrived with materials prepared in accordance with his pre-established plan and demonstrated further improvement in this area. An excerpt from a mentoring lesson pertaining to this practice is provided below:

PT3: Let's do this on the dark side, it looks better (it unplugs the Plasma ball and puts it on one of the middle rows, opens it there, and allows students to observe there).

Table 5 indicates that prior to mentoring, only PT3 demonstrated improvement in the practice of asking questions with short answers (B–10), while both PT2 and PT3 were at an advanced level during mentoring. Additionally, before mentoring, all three teachers were classified as engaging in the practices of making definitions (B–5) and short repetitions (B–11), which required improvement in the main themes of the lesson. However, during the mentoring sessions, the teachers demonstrated improvement in the areas identified for development based on the analysis of lesson observations. Despite improvement, it was found that PT3 did not give sufficient attention to mentoring and only briefly summarized the course material by practicing collecting the main themes of the course (B–5). It was also observed that PT3 made short explanations at the end of the lesson (B–11) without adequate preparation. Although PT3 demonstrated improvement compared to the pre-mentoring period in both practices, he did not reach the expected level. Regarding these practices, the course citations of PT3 during mentoring are given below:

PT3: You just said before that this is my teacher made from the same material. The density is equal to each other. We found the mass and volume of this, we divided it. In the same way, we found the mass and volume in this, we divided it (He shows the cubes from small to large at this time). Normally, if he did not make a measurement, these friends should be divided by the volume of these three masses. (Students answer that it should be equal). It should be equal.

PT3: So, is it the case with fluorescent lamps? Gas is ionizing with high voltage. As a result of that ionization, white or coloured appearances are obtained. Now I think it's about to ring, that's it for today.

Developmental analysis of the theme of teachers' student-centred approaches

The following table summarizes the developments of PT1, PT2, and PT3 in line with the needs determined before mentoring regarding the theme of student-centred approaches.

Table 6

Change of teachers' competencies related to the theme of student-centred approaches

Classifications	Codes	Before Mentoring	During Mentoring	After Mentoring
Activities that definitely need improvement	C1: Making thought-provoking short questions during lecturing, low-level mental activity	PT2		
	C2: Keeping the student mentally active in the process of accessing knowledge	PT1, PT2, PT3	PT2, PT3	PT2
	C3: Keeping the student physically active	PT1		PT2
	C4: Learning the student (new knowledge) the transportation process	PT1, PT3	PT1, PT2, PT3	PT1, PT2, PT3
	C7: Cooperation among students	PT1, PT2, PT3	PT2, PT3	PT1, PT2, PT3
	C8: Carrying out individual activities	PT1, PT2, PT3	PT2, PT3	PT1, PT2, PT3
	C9: Guiding the student in the process of accessing information	PT1, PT2, PT3	PT3	PT1, PT2
	C10: Making flexible time planning according to the student's needs	PT1, PT2, PT3	PT2	PT1, PT3
Activities proposed to be developed	C1: Making thought-provoking short questions during lecturing, low-level mental activity	PT1, PT3	PT1, PT3	PT1, PT2, PT3
	C2: Keeping the student mentally active in the process of accessing knowledge		PT1	PT1, PT3
	C3: Keeping the student physically active	PT2, PT3	PT2	PT3
	C5: Listening the student's answers and explanations and giving feedback	PT3		
	C6: Providing the correction of the student when it is wrong and overcoming the mistake		PT2	
	C7: Cooperation among students		PT1	
	C8: Carrying out individual activities		PT1	
	C9: Guiding the student in the process of accessing information		PT1, PT2	PT3
	C10: Making flexible time planning according to the student's needs		PT1, PT3	PT2

Developed by authors

The analysis of course observations was conducted to determine the needs of three teachers before mentoring practices. Within the framework of student-centred approaches, all three teachers were classified as activities that should definitely develop, such as keeping the student mentally active during the process of accessing knowledge (C–2), guiding the student in the process of accessing information (C–9), and making flexible time planning according to the student's needs (C–10). In addition, PT1 and PT3 exhibited the practice of making thought-provoking short questions during lecture making (C–1), while PT2 and PT3 performed the practice of keeping the student physically active (C-3), which needed improvement. Furthermore, PT1 and PT3 improved themselves in keeping the student physically active during mentoring, while only PT1 maintained this development after mentoring. On the other hand, all three teachers needed improvement in practices such as learning the student (new knowledge) transportation process (C–4), cooperation among students (C–7), and carrying out individual activities (C–8). The following excerpt from mentoring lessons during which the PT1 demonstrated the practice of keeping the student physically active (C–3) at an advanced level during the mentoring period:

PT1: Friends, you work in physics and tell the result. What could it be? (a student wants to get up on the board and solve it) Let us see. Did you say six?
Student: Yes (Student tells about the solution).

In Table 6, it was determined that PT1 exhibits advanced practice before mentoring in the practice of providing the correction of the student when it is wrong and overcoming the mistake (C–6) while continuing to exhibit advanced practice during the mentoring. Before, during and after the mentoring PT1 shows the advanced practice of providing the correction of the student when it is wrong and overcoming the mistake (C–6) and the excerpt from of this practice is as follows:

Student: Teacher protons push electrons.
PT1: (Surprised) Pushing? Were protons repelling electrons?
Student: Excuse me, pulling.

Table 6 shows that before mentoring, both PT1 and PT3 were at an advanced level in the practice of providing correction to students when they are wrong and helping them overcome their mistakes (C–6), while PT2 was classified as needing improvement in this area. The needs assessment studies before mentoring showed that all three teachers needed to improve in all areas except for C–5 and C–6. During mentoring, all three teachers showed improvement in the practice of listening to students' answers, explanations, and giving feedback (C–5), and this development continued after mentoring. PT3, who needed improvement in C-5 before mentoring, made significant progress during mentoring. Furthermore, PT1 and PT2, who were already advanced in C-5, showed continued improvement after mentoring. Finally, PT2, who needed improvement in C–6 before mentoring, developed significantly in this area during mentoring. The excerpt of PT3 from this lesson during mentoring is given below:

PT3: Yes, my son. (He recognizes a student who asks questions)
Student: Teacher, isn't it heterogeneous when mixed?
PT3: My son, look, listen to me … (It opens the part he explained yesterday from his source.) Yesterday while I was writing the properties of the gases to you, the gases can mix with each other at any rate.

In Table 6, the excerpt from the mentoring lessons about the practice of getting PT3's correction when the student made it wrong and overcoming the mistake (C–6), which showed advanced practice before mentoring and continued this situation during mentoring, is as follows:

Student: Adhesion and cohesion and water to gain a certain height.

PT3: Will there be a certain height of water with adhesion and cohesion»? It will (he says with the students). There is both sticking and holding. With that effect, let's say the water rises or descends in thin pipes. OK? Can anyone write descriptions as they understand?

In Table 6, the excerpts from the mentoring lessons of PT3, which did not pay much attention to the practice of keeping the student physically active (C–3) before mentoring, but who developed themselves by doing the activities that he prepared before, during the mentorship, are as follows:

PT3: Now, two of our volunteer friends come. We have an event here. We will do it. We will get a conclusion from their (call two students to the blackboard).

Developmental analysis of the theme of teachers' assessment and evaluation approaches. The following table summarizes the development of PT1, PT2, and PT3 in line with the needs determined before mentoring regarding the theme of assessment and evaluation approaches.

Table 7

Change of teachers' competencies related to the theme of assessment and evaluation approaches

Classifications	Codes	Before Mentoring	During Mentoring	After Mentoring
Activities that definitely need improvement	D–1	PT1, PT2, PT3	PT1, PT2, PT3	PT1, PT2, PT3
	D–2	PT1, PT2, PT3	PT1, PT2, PT3	PT1, PT2, PT3
	D–3	PT1, PT2, PT3	PT2, PT3	PT1, PT2, PT3
	D–4	PT1, PT2, PT3	PT2, PT3	PT1, PT2, PT3
	D–5	PT1, PT2, PT3	PT1, PT2	PT2, PT3
	D–6	PT1, PT2, PT3	PT1, PT2, PT3	PT1, PT2, PT3
Activities proposed to be developed	D–3		PT1	
	D–4		PT1	
	D–5		PT3	PT1

(D–1: Using materials and equipment, D–2: Using traditional measurement-evaluation tools, D–3: Using performance-based measurement-evaluation tools, D–4: Giving feedback to evaluation studies, D–5: Giving performance homework in the course, D–6: Giving a grade in during course)

Developed by authors

Table 7 presents the needs assessment results of PT1, PT2, and PT3 regarding measurement and evaluation activities before the mentoring practices. All three teachers were determined to be in need of improvement in all practices related to measurement and evaluation activities. However, in the analysis of the mentoring course observations, only PT1 improved himself in the practices of using performance-based measurement-evaluation tools (D–3) and giving feedback to evaluation studies (D–4), while only PT3 improved himself in the practice of assigning performance homework to students (D–5). Although some improvement was observed in these practices, the desired level of development was not achieved. Before mentoring, PT1 did not pay attention to using performance-based measurement-evaluation tools (D–3) and giving feedback to evaluation studies (D–4). During the mentoring lessons, PT1 developed himself with the help of short interactive presentations and worksheets, as evidenced by the following excerpts from the courses.

PT1: Yes students, gather books and notebooks, write your names on your paper, send forward and let them take them. (Students give the papers to PT1). Let me take the papers. Now I will make a statement, students. After the explanation, I will make a quiz.

PT1: Look, what did one of the friends (put the paper up in the air) put a burden on it? There are arrows around this, with lots of particles or something. As the arrows get too far away from the place close to the load, the arrows decrease. In this way, friends who have revealed the scope of the load.

It was determined that PT3 developed the practice of giving performance homework in the course (D–5), which he did not pay attention before mentoring, but still could not perform at the desired level. The quotations of PT3's lessons during the mentoring practice of giving performance homework in the course (D–5) are given below.

PT3: This track is called 'Cruise Control', let's research for tomorrow.

DISCUSSION AND CONCLUSION

The purpose of this study was to investigate the impact of a curriculum based on contemporary approaches on classroom practices, through the implementation of group mentoring sessions. In contrast to traditional in-service training activities, this study utilized a narrative approach that centered on the individual and group needs of teachers. By focusing on the specific competencies outlined by the Ministry of National Education, including course entry activities, didactic structures, student-centered approaches, and assessment and evaluation strategies, the study aimed to provide targeted professional development opportunities for teachers. The findings of this study have important implications for the ongoing professional development of teachers, as they suggest that group mentoring can be an effective approach for improving classroom practices and promoting the adoption of contemporary teaching methodologies.

According to the results of the study, the teachers demonstrated improvement in realizing all practices categorized under course entry activities, and the group of teachers showed notable improvement in the practices of greeting students and informing them about the aim. However, the practice of greeting the class was not realized at the expected level before the implementation of mentoring practices. It is noteworthy that greeting the class is considered crucial in terms of facilitating effective communication in the classroom, as emphasized in previous studies (Akdağ et al., 2006; Göçer, 2016; Özkan, 2008; Sert, 2016). Nonetheless, it is suggested that teachers' familiarity with the class may support their

development, which could explain the improvement observed in this practice following the mentoring sessions. The improvement observed in greeting the class is seen as a reflection of teachers' efforts to enhance their communication with students. Moreover, the positive impact of mentoring practices on teachers is evident from the observation of practices such as attracting students' attention and motivation, which were not previously observed before the mentoring sessions. In relation to informing students about the aim of the lesson, prior studies by Akbıyık and Seferoğlu (2012), Beyaztaş et al. (2013), Karaağaçlı and Erden (2008), Koçoğlu (2013), Şahin (2014), Usta (2015), Yeşil (2008), and Yıldız et al. (2012) have shown that communicating the aim increases students' motivation and interest in the lesson. The present study reveals that mentoring practices specifically developed for course entry activities have been effective in enhancing teachers' performance in this area. By enabling teachers to identify their weaknesses and work on improving them, the study has contributed to the establishment of healthy communication between teachers and students. As evidenced by the development of the practice of greeting students, the results suggest that the mentoring sessions have been successful in achieving this goal, especially among teachers.

Upon analyzing the teachers' didactic structure practices, it was discovered that teachers tend to provide more instructional explanations than necessary, which negatively affects students' ability to structure their own knowledge and often imposes the lesson's content. It was observed that these practices were more prevalent in classes that adopted traditional teaching methods, with the teacher being the dominant figure in the classroom. In such classrooms, teachers tended to use short-answer questions to involve students in the lesson and sometimes incorporated real-life examples at the end of the lesson. However, such practices, particularly memorized instructional explanations and short-answer questions, were found to hinder students' self-structuring process, and therefore, they were regarded as negative situations and were emphasized during the mentoring process. Previous studies by Akpınar and Aydın (2010), Arslan (2012), Ay (2013), Bıkmaz (2006), and Özerbaş (2007) suggest that traditional teaching approaches still rely heavily on the teacher and their past habits. It was noted that scientific discussions and practices that support students' knowledge structuring process were not being incorporated in the lessons. Instead, teachers often relied on short-answer questions, as it was considered the shortest route to reach their goal. Köken (2002) stated that this preference was due to the technique's efficiency. Sağır and Kılıç (2013) emphasized that scientific discussions in the lessons can lead students towards scientific thinking and highlighted the importance of verbal communication to achieve this. Before the mentoring process, needs assessment studies indicated that teachers frequently used instructional explanations and dictated the course content, leading to overused practices. As a result, the mentoring process focused on supporting student-centered teaching practices, such as in-class activities and scientific discussions. Effective communication between mentors and mentees is critical in developing such unconventional practices, and the initial meetings, where needs and expectations were discussed, facilitated the interaction between the mentors, thereby strengthening their trust.

Based on the information provided, it seems that the mentoring program was effective in helping teachers develop student-centered activities and use different assessment and evaluation approaches. However, there were some issues with the sustainability of these changes, as teachers did not continue to implement them consistently. One positive outcome of the mentoring program was that teachers improved in their ability to listen to students' answers and provide feedback. However, there was a lack of diligence in responding to student answers. The mentoring program emphasized the importance of measurement and evaluation activities, and it seems that the teachers tended to move away from traditional assessment methods and use performance-based tools. This approach is supported by research by Berry et al. (1995), Clark (1995), Çakır (2015), and Sezgin et al. (2014). The feedback

provided by the mentors played an important role in helping teachers overcome deficiencies in the process. The statement by Bakioğlu et al. (2010) that mentoring is a shared process is also relevant here, as it highlights the importance of both mentors and mentees collaborating to build the mentoring process. The cessation of mentor support may be a reason why teachers did not sustain the changes in practice.

In general, it appears that the mentoring program yielded favorable outcomes for the involved teachers; however, there were certain obstacles in maintaining the newly implemented practices. To ensure the durability of these changes, it may prove beneficial to investigate approaches for providing continuous support and feedback to teachers after the conclusion of the mentoring program.

The studies on the mentoring process emphasize the importance of determining the needs of the mentees and informing them about their deficiencies (Boswell et al., 2015; İlhan, 2013; Yost, 2002). The positive effects of the mentorship program on the participating teachers' classroom practices were determined. This indicates that the mentorship support, provided by the mentors collecting evidence-based (video recordings) data about the teachers, had a persuasive effect and can be considered as an indicator of a successful process. Kay and Hind (2009) state that successful mentors should possess skills such as motivation, influence, gathering evidence, acting together, counseling, time management, and providing professional development. Other studies on mentoring support also reveal similar results. Aslan and Odabaşı (2013), Bierema and Meriam (2002), Crisp and Cruz (2009), Jacobi (1991), İlhan (2013), Rawlings (2007), Rhodes et al. (2004), Şahinoğlu and Sağlam-Arslan (2019), Tükeltürk and Balcı (2014), Yirci (2009) and Yirci and Kocabaş (2012) emphasize the academic, personal, and emotional development of the mentees due to mentoring.

Research suggests that a successful mentoring process should be planned and carried out in a sharing-based approach between the mentor and mentee to ensure positive outcomes for both parties (Hacıfazlıoğlu and Özcan, 2010). The effective mentoring practices implemented in this study support this notion. Additionally, mentoring can not only introduce new behaviors to the mentee but also help reveal existing ones (Bakioğlu, 2015; Kocabaş and Yirci, 2012; Özdemir and Boydak-Özan, 2013).

In this research, it has been determined that the teacher training model, based on applied and needs assessment and supported by mentoring practices, make a significant contribution to the academic and personal development of teachers. For future research, it is thought that, implementing the mentoring model in the long term may further promote the development of teachers' practices and ensure the sustainability of the changes made. Collaborative work between mentors and teachers, as well as group work among teachers, may facilitate achieving desired goals in the teacher-training model based on needs assessment. On the other hand, implementing mentorship programs with an increased number of participants for a longer period will support the broader diffusion of this model.

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ОЦІНЮВАННЯ ДІЯЛЬНОСТІ ВЧИТЕЛІВ З ПІДТРИМКОЮ НАСТАВНИЦЬКИХ ПРОГРАМ

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Метою цього дослідження є оцінка впливу практики наставництва, розробленої для підтримки вчителів у впровадженні оновленої навчальної програми з фізики, на практику. Для досягнення цієї мети була розроблена триетапна модель із застосуванням підходу групового наставництва, яка складається з підготовки (оцінка потреб для визначення поточного статусу вчителя), реалізації (практики наставництва, спрямовані на усунення виявлених прогалин у знаннях предмета) та загальної оцінки (оцінка впливу практики наставництва на практику вчителів до, під час і після процесу впровадження). Було прийнято дидактичний інженерний метод, і протягом 16 тижнів спостерігали за трьома вчителями фізики за допомогою записів камери. Спостереження були класифіковані відповідно до компетентностей у галузі фізики, і відповідно була проаналізована практика вчителів. Отримані дані свідчать про те, що підтримка наставництва мала позитивний вплив на розвиток вчителями дидактичної структури та підходів, орієнтованих на учня, з деяким регресом, який спостерігався після припинення наставництва. Проте практика вчителів залишилася кращою порівняно з початковим станом. Це дослідження було обмежене трьома вчителями-добровольцями з фізики, але результати свідчать про те, що наставництво може бути ефективним для покращення дотримання вчителями навчальної програми в галузі прикладної педагогічної освіти, і дослідження має практичні наслідки для підготовки та професійного розвитку вчителів. Дослідження робить внесок у поле, надаючи інший погляд на підготовку вчителів, наголошуючи на практичній підготовці та оцінці потреб, а не на теоретичній освіті.

Ключові слова: *вчительські практики, наставництво, підготовка вчителів, професійний розвиток учителів.*