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Collaborative Mentoring as a Way of Meeting Teachers' Inclusive Teaching Practices Needs: Investigating Learning Outcomes

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Abstract:
Introduction: This article discusses a mentoring project that was aimed at improving the inclusive education practices of teachers.
Methods: There were 10 mentors who were faculty members in science education and special education. Mentees were 59 teachers who have an inclusive student in their class or school. A qualitative approach was chosen.
Results: Reported learning outcomes referred to changes in knowledge related to "Basic Concepts", "Educational Support and Legislation", "Assistive Technology", and "Educational Accommodations".
Discussion: The results of this study points to the needs for more interdisciplinary collaboration studies in order to support teachers' dealing with diverse students.
Limitations: The results of the study are bound to the project duration and the place of the study.
Conclusions: The current collaborative mentoring study has several contributions for teachers in terms of their knowledge and skills in implementing an effective inclusive education.

Key words: interdisciplinary collaboration; inclusive education; assistive technology; visually impaired; science education.

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Introduction

Teacher education literature has emphasized the importance of systematic collaboration between faculty and teachers (Erickson et al., 2005; McCotter, 2001; Putnam & Borko, 2000) which has been recognized as a promising way for enhancing professional knowledge (Burns et al., 2015) and addressing fundamental issues related to student learning (McCotter, 2001). Especially, due to the well-known divide between the theoretical teacher education courses and field experiences (Dani et al., 2019; Metsala & Harkins, 2019; Zeichner et al., 2015), collaboration might be a solution for eliminating the ongoing barriers.

One of the areas that this divide is seen mostly is related to the inclusive education (IE) practices mostly due to the inadequate training provided in teacher education programs (Nam et al., 2013; Opie, 2018). IE is based on the assumption that equal opportunities can be created in educational settings for both students with and without disability (Nilholm & Göransson, 2017). Internationally, several factors are found to be related with the success of IE including teachers' attitude (Akalin et al., 2014; Nel et al. 2014), self-efficacy (Jordan, 2018; Metsala & Harkins, 2019; Zelina, 2020), a lack of teacher knowledge in teaching students with diverse needs (Morgado Camacho et al. 2017), lack of knowledge in assistive technology (AT) integration (Fernández-Batanero; 2019; Cappuccio et al., 2016), and lack of adequate time (Horne & Timmons, 2009). These studies imply that teachers have limited training, thus they lack the skills to teach students with disabilities. Consequently, considering these factors and the presence of students with disabilities in the general classrooms is an increasing reality (Suc et al., 2017), collaboration becomes indispensable in order to have a better successful IE (Suc et al., 2017; Weiss et al., 2017). In order to improve the educational outcomes in an inclusive setting, it is possible to develop solutions for ongoing problems by combining different expertise in an effective and creative way (Engeström, 2015) which is attributed as a proactive step for tackling inclusive educational practices (Gerdes et al., 2020; Hedegaard-Soerensen, 2018).

Consequently, collaboration has been a hallmark in IE practices as different stakeholders try to nurture meaningful learning experiences of students with disabilities (Friend & Cook, 2010). Teachers and faculty members can collaborate together with a mutual goal to better improve the teachers' skills and in the end improve the learning of students (Kamalı Arslantaş & Kocaöz, 2021; Munthe & Rogne, 2015). Despite the literature provides information on the problems observed related to the IE practices, it lacks providing teachers with collaborative learning environments that offer a flexibility in the process shaped based on their needs. Therefore, in the current study, it was aimed to conduct an interdisciplinary collaboration-mentoring program to improve the in-service teachers' inclusive teaching practices during which the program was progressed

based on the teachers' needs and decision making. The article discusses the learning outcomes of the teachers.

1 Teachers' role in IE

There are differences in the implementation of IE practices around the world (Florian, 2014). However, internationally the role of the teachers in implementing effective IE is at the central importance since most of the challenges faced are related to the teachers themselves. In order to prevent those challenges and improve the IE practices teachers need to be prepared to implement IE (Zagona et al., 2017) and providing teachers with more knowledge and experience should be the priority in order to catch success in IE (Akalin et al., 2014).

Teachers' lack of knowledge in IE is related to several areas based on the literature review. The first issue is related to the teachers' misconceptions of basic terms (Carballo et al., 2019; Kilinc, 2019). As Carballo et al. (2019) indicated faculty members in their study figure disability as a barrier to the development of the people with a disability. Thus, understanding and transforming teachers' misconceptions is a key issue in the IE process. Similarly, the literature shows that teachers also lack information related to the legislation about inclusion (Anglim et al., 2018; Carballo et al., 2019; O'Connor et al., 2016), the rules of the institutions (Gelbar et al. 2015) and how to support the education of inclusive student (Aktan, 2020; Gelbar et al.,2015). In order to support an inclusive student, it is critical for the teachers to know special education legislation, the rules of their institutions and educational support opportunities that they can benefit.

Teachers are also expected to have expertise in educational accommodations in supporting inclusive students in meeting academic standards (Harrison et al., 2013; O'Connor et al., 2016) which is also covered in educational policies. The major goal of the IDEA (2004) was to create an accessible learning environment to the maximum extent, which can be accomplished with the educational accommodations. Research shows that inclusive students have difficulties in performing academic success and need effective instruction (Blanton et al., 2017). This issue can be achieved by improving teachers' knowledge in basic material adoptions, developing curricular materials and also AT knowledge and awareness. The other point literature put forward is the teachers' lack of knowledge in assistive technology (AT) (Nam et al., 2013; Opie, 2018; Zapf et al., 2016) which also negatively effects the IE practices. The significant contribution of AT has been emphasized by the literature in terms creating an accessible and equal learning environment for the inclusive students (Susanto & Nanda, 2018; Yalçın & Kamalı Arslantaş, 2020). Thus, teachers' skills related to AT knowledge should be supported and improved.

2 Problem area

IE has mostly taken its place in Turkish policy and educational practices in recent years. IE has been associated with the students with disabilities in Turkey. In Turkey, support education services are provided for teachers and students with disabilities who are two important elements of inclusion process. These services can be provided through three different ways including support education classrooms (MoEU Special Education Services Regulation, 2018), classroom assistance (Ahmmed, Sharma, & Deppeler, 2014; Batu & Topsakal, 2003) and special education counselling (Ahmmed, Sharma, & Deppeler, 2014).

However, likewise the problems occurred in IE internationally, these problems have also been observed in Turkey mainly due to the teachers' lack of knowledge and skills in implementing effective IE (Akalin et al., 2014). One of the biggest challenges faced in Turkey is related to the inclusion services provided for students with visual impairment (VI) since regulations made for these students in inclusion classrooms are limited (İşlek, 2018; Yalçın, 2015). Therefore, these students cannot participate in this process with equal opportunities with their peers. Students with VI use more different materials than their sighted peers (Tuncer, 2014; Yalçın & Altunay Arslantekin, 2019) and also need different regulations in order to access the materials (Yalçın & Kamalı Arslantaş, 2020). However, support personnel service that provide such support and adaptations for students who attend inclusion classrooms is not available in Turkey. Therefore, the whole process is tried to be managed by classroom or branch teachers. Furthermore, literature emphasized that teachers also lack the understanding of how to adapt the content and materials especially for students with VI, a gap in knowledge affects their skills to implement IE (Yalçın, 2015).

One of the fields this gap is seen is related to the science education of students with VI where visual elements and abstract concepts are intense, need more different teaching strategies (Atila, 2017; Okçu & Sözbilir, 2017) and materials (Atila, 2017; Şahin & Yörek, 2009) than their sighted peers. Teachers' lack of training in teaching science to VI effects the science learning process of students with VI negatively and students do not show the expected efficiency in science laboratories, they have low motivation in lessons and develop misconceptions (Bell & Silverman, 2019; Gül, Yazıcı, & Sözbilir, 2016). As a matter of fact, a limited number of studies in the literature show that students with VI learn the outcomes of the science lesson when learning materials are prepared or adapted for their needs (Yazıcı & Sözbilir, 2020; Okçu & Sözbilir, 2016; Teke & Sözbilir, 2019). For this reason, it is crucial to make the appropriate material and educational accommodations available for the students with VI who are educated both in schools for the visually impaired and in inclusion classrooms.

Literature highlighted collaboration as an important strategy in order to support teachers in dealing with the diversity of students (Gerdes et al., 2020;

Hedegaard-Soerensen, 2018; Nochajski, 2002; Suc et al., 2017; Weiss et al., 2017). There is an increasing tendency in recent years to conduct research projects on teachers' collaborative practices related to inclusion (Hedegaard-Soerensen et al., 2018; Ní Bhroin & King, 2020). These studies provide promising results for the effectiveness of IE, however still there is a need for more research projects to effectuate IE practices due to the problems highlighted. In order to fill this gap, a comprehensive research project was initiated in Turkey with twofold purposes. Firstly, project aimed at improving the knowledge of teachers in IE. The second purpose of the study was to improve the science teaching skills of teachers for VI. The general structure of the project was determined by the researchers based on the needs of the teachers related to IE reported in literature. However, the process was reshaped based on the participants' needs. Thus, the current study contributes to the small body of literature which is conducted for improving IE practices of teachers which were shaped and progressed with the needs of teachers. Interdisciplinary collaborative mentoring program was thought of as a way of ensuring the flexibility of the process. Researchers believe that it is possible to enable teachers to feel competent and have self-efficacy in order to improve their IE practices, when the procedure is left to their preferences. By this way researchers had a chance both to understand the specific needs of actual practitioners related to their inclusive teaching practices and to meet their needs immediately right after they required. The study focused on the learning outcomes of the interdisciplinary collaborative mentoring program.

3 Methods

3.1 Research design

This research investigated the learning outcomes of the interdisciplinary collaborative mentoring program which was conducted to improve 3th and 4th grade in-service teachers' inclusive teaching practices and provided them with knowledge and experience related to those needs. A qualitative approach was chosen as the research methodology, which allows researchers to do an in-depth description of the researched phenomenon. The research question guided the study was "Which learning outcomes do teachers report?"

3.2 Research setting and procedures

The current study was initiated in Turkey, in 2019 and involved a collaborative partnership between a group of teachers and faculty members of a university in Turkey. The collaborative work of the participants can be associated with the efforts to create an inclusive learning environment and to improve the teachers' inclusive science teaching practices. Despite the general outline of the project was determined by the project team, the content and the process reshaped

depending on the participant teacher' needs. The purpose of the current study was twofold, and thus it progressed in two stages. In the first stage, four panels, 1 conference and 1 seminar were conducted to provide teachers with knowledge and experience related to effective IE considering their missing information. The second stage of the project focused on the science teaching practices regarding the students with VI due to problems mostly faced in science classes. At this stage teachers developed hands-on science curriculum materials while benefiting from the affordances of assistive technologies. The study implemented an interdisciplinary collaborative mentoring program. The findings of the mentoring program can be found in the article written by Yalçın and Kamalı Arslantaş (2020).

First Stage: Panels, Conference and Seminar

Four panels were conducted and mostly, the content was related to the teachers' lack of information regarding general IE issues. Panels progressed as both informative sessions and discussion sessions. During the panels, discussions were conducted between groups and within groups. During the conference and seminar, mentors guided the process as those sessions were more informative.

Second Stage: Workshops

Workshops focused on the inclusion of students with VI who are demonstrating difficulties in science education. In the second stage of the project, six workshops were conducted through an effective collaborative partnership among pedagogically diverse groups who can benefit from the process and correspondingly benefit the students they teach. Five individuals with diverse backgrounds composed a group to create science curricular materials for third and fourth year students. Several AT were used in this process, in order to improve teachers' skills in using AT. Figure 1 presents the whole process related to the project.

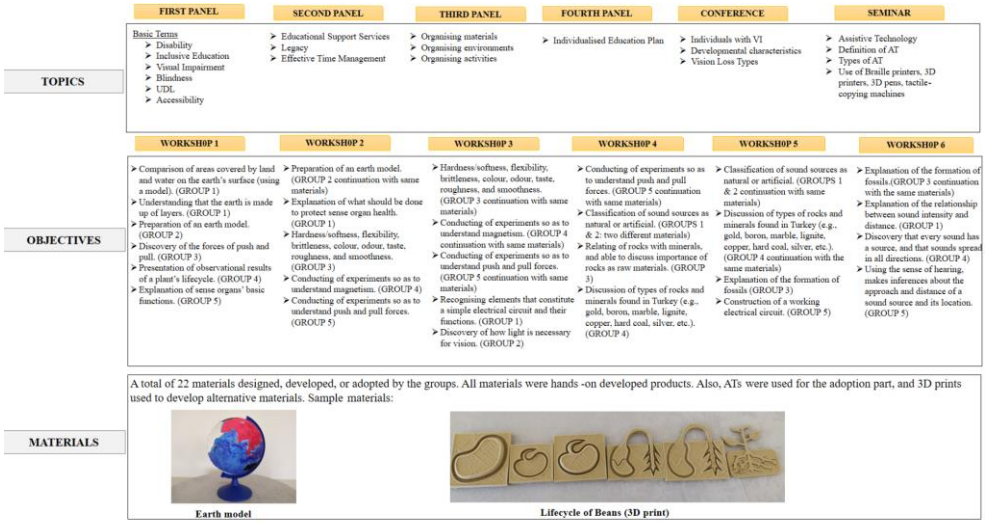


Figure 1. The whole process of the project.

Teachers were grouped into five people during the material development process. Academicians from special education and science education departments took part in each group. The features that should be in the material to be developed or adapted first were discussed and listed in the groups. The important issue was that the material developed or adapted should be available for both sighted, low vision and blind students at the same time. All of the materials were tested by one student with low vision and one student with total blind. They evaluated the materials.

3.3 Participants

The participants of the study included both mentors and mentees. There were 10 mentors who were faculty members in science education and special education at a university. They attended all the steps of the study. Mentees were teachers who are working at different schools and have an inclusive student in their class or school. 59 teachers who are teaching 3rd or 4th grade students joined the panels, conference and seminar. Among those participants, there were 23 science teachers, 36 classroom teachers. During the panels the groups were formed with five to six people, and all groups included teachers from both of the disciplines. Mentors directed the discussion sessions and provided informative explanations about the points mentees required.

During the workshops there were 23 teachers who also attended the panels. The rest of the teachers could not join the workshops due to the time restrictions they had in their schools. Thus, mentees were selected based on the convenience sampling method. 2 mentors were assigned to each group. Mentors and mentees were grouped randomly.

3.4 Data collection

Observation Forms

In the first stage of the study, observation forms were the main data sources. Observation forms were filled by the mentors during all events including panels, conference and seminar. During the within group discussions mentors used these forms to understand the needs of the teachers regarding inclusive education. This was done in order to reshape the content depending on the teachers' needs.

In the second stage (during workshops) of the study another observation form was filled by the mentors. The mentors filled the forms and took notes while the materials were developed and the students with VI tested the materials.

Focus Group Interview Schedules

At the end of the whole process, focus group interviews were conducted with all participants who attended all of the stages. An interview schedule with open-ended questions and prompts was developed. The purpose of the interview was to understand the opinions of the teachers regarding the procedure, the role of the collaborative mentoring program in meeting their needs and their learning outcomes. Researchers specifically looked for the changes in teachers' knowledge related to effective inclusive teaching. The interviews were audio recorded and all of them lasted between 45 minutes to 1 hour.

3.5 Data analysis

The researchers conducted content analysis for all the collected data. Firstly, the researchers transcribed verbatim audio data and then read all the observation and interview data. The codes observed in the data were determined by the researchers. Based on the codes that emerged in the first stage, the themes that can explain the data at a general level were determined. Both of the researchers actively took part in all stages and together they finalized the analysis by trying to find the most plausible codes. First two researchers independently analyzed data and then listed learning outcomes identified in the data. Then researchers met regularly to compare their codes and themes. Thus, intercoder reliability was assured in the study.

4 Results

The data showed that classroom and science teachers lack basic information related to IE which is similar to the literature review findings and they did not practice material adoption, design and development before. Teachers reflected their positive perceptions regarding the process and reported that project was effective in meeting their learning needs. Learning outcomes of teachers in the current study refers to changes in their knowledge which are grouped as "Basic Concepts", "Educational Support and Legislation", "Assistive Technology", and "Practicing Educational Accommodations". Frequencies of reported learning outcomes are presented below.

Table 1

Frequencies of reported learning outcomes

Learning Outcomes (Changes in Knowledge)	f	
Basic Concepts	248	
Disability		69
Inclusive Education		102
Accessibility		77
Educational Support and Legislation	177	
Educational Support Services		62
Legislation & Rules of the Institution		59
Regulations		56
Assistive Technology	152	
Definition of AT		86
Types of AT		66
Practicing Educational Accommodations	145	
Quick, simple and functional arrangements		48
Material design and development		53
Use of specific assistive technologies		44

Basic concepts

According to the results of the study, teachers had deficiencies about the basic terms and how to understand the diverse needs. They specifically asked for help on their conceptions of some terms, which were disability, IE and accessibility. For this purpose, mentors organized the first panel and covered basic terms and issues related to understanding the individualized needs of students. The interview data and observation data showed that teachers' understanding of those terms progressed an important change.

As teachers indicated, they do not know how to address a student with a disability in their classes and they always feel nervous about this issue. They

mostly used terms "handicapped" and "obstacles". The way teachers figure out disability had negative implications as they thought individuals with disability have serious limitations in daily live activities and in lessons. This situation causes them to have low expectations about those students. At the end teachers indicated they improved their understanding of disability as a term and changed the way they understand disability. Teachers also indicated that the other concept confusion they need to clarify is related to inclusive education. Teachers stated that they have heard the term IE in recent years, and they needed information on who is responsible for inclusive education, and how it should be provided. As they indicated, they have never been informed when an inclusive student participates in their class. Thus, mentors targeted to provide information about IE and UDL. Teachers indicated that they figured out they should support all students with usable and accessible education whether they have a disability or not.

The other confusion of the teachers was related to accessibility issues. Teachers stated that they know that accessibility is only dealt with in the context of physical structures and they do not have information about other conditions. Especially teachers had problems in the exams as they do not know how to target the students with disabilities. In the panels, they were informed about different accessibility issues especially the educational accessibility. They were provided with useful accessibility applications such as giving additional time in the exams, providing support for sight reader-writer, and delivering the exam paper in braille format. Teacher also explained that they are better in understanding accessibility term and they know it covers many fields and not only limited with physical environment.

Educational support and legislation

The second main category teachers needed information is related to the educational support services and legislation as they lack the specific information. Teachers stated that they are provided with limited information when an inclusive student is placed in their class. Teachers' lack of information about this issue causes a huge gap between applications and thus inconsistency between schools. Furthermore, teachers also asked for the information related to the educational support services and also they had very little information about any kind of regulations. During the second panel, mentors informed teachers about how they can support inclusive students and what legislations there are the about this issue.

Additionally, teachers needed information on how to support inclusive students with accessible educational materials and about the regulations to support the participation of the inclusive student in the lessons. Mentors informed about the procedures how to get and require additional resources for inclusive students.

Teachers were informed that they can require materials by requesting them from provincial national education directorates by writing an official letter as shown in the following excerpt:

I have a student with low vision in my class, I was only explaining the content and materials aloud for him. But now, I figured out that these students can use vision as their primary senses but need regulation (Focus Group 2).

Furthermore, teachers were informed about the environmental, setting and educational accommodations that should be made to support inclusive student's participation in the lesson, and what arrangements each includes. Very similar results were found related to their initial information of preparing individualized educational plans (IEP). Teachers stated that they had no information about how to prepare IEP, how to attend an IEP meeting and also who is responsible for all of these issues. Teachers were informed about the IEP processes.

The other issue teachers required help with is related to the time management issues. The teachers stated that they were insufficient in planning the lesson and using time effectively and efficiently in inclusive classrooms. Mentors conducted a discussion using sample cases and showing sample videos, in order to show how to use time efficiently. One of the teachers stated that:

It seemed very difficult for us to teach in classes with inclusive students. I also believed that it was unfair to devote the whole time to an inclusive student. However, the teacher in the video showed in the panels, involved both his/her inclusive student and the other students in the course during a course hour… (Focus Group 3).

Another issue teachers mentioned was related to the negative attitudes of the families whose child has a classmate with a disability. Teachers required information on how to deal with the negative attitudes of families about the way they react to inclusive students. Teachers were informed about the ways they can follow like informing the students and their families about the IE and the inclusive students. During the information process they were recommended to use sample games, videos and talking with the other partners who experienced the same issues.

Assistive technology

The next most mentioned item by the teachers was their improvement in AT. Teachers stated that they learned several varieties of assistive technologies that they can afford, reach and use in their classes. According to the findings, teachers had conceptualized AT as high-level technology in their minds and therefore stated that they never benefit from technological solutions. During the panel, teachers were informed about the definition of AT, types of AT and several sample AT from low tech to high tech including 3D pens, 3D printers, and PIAF machines.

There has been a 3D printer at our school for three years. None of us used it because we did not know how to use it. In the workshop, I understood that it is very simple to use it and Swell Paper as well (Focus Group 4).

Educational accommodations

Teachers expressed their improvement in learning basic simple arrangements which has significance for them due to their difficulties with time and the problems they had in developing the curriculum during the first stage. Mentors determined several objectives from the science curriculum and distributed to groups. The groups brainstormed during the material adoptions. During the interviews, all of the teachers stated that they learned many quick, simple and functional arrangements in the workshops held.

Furthermore, teachers learned modifications targeting the students with various visual loss. With the workshops, they stated that they learned that the materials that appeal to multiple senses (tactile and auditory) are more effective for students with total blindness and that for students with low vision, materials that will appeal to the senses of vision, hearing and touch should be prepared or existing materials should be adapted within the framework of these senses.

It always frightened me to organize materials for students with low vision. But I learned that I can adapt with a simple top-up or contrasting light and dark colours. (Focus Group 3).

In addition to the basic modifications teachers also experienced material design and development in groups. Teachers also reflected that they learned with easy-to-reach materials that it is possible to develop specific materials for the students with VI. 22 materials were developed during the workshops which also can be perceived as the output of the project. Those materials were tested by 2 students with VI and they explained their positive experiences. During the material development process, teachers also experienced the use of specific assistive technologies. For example; the ear and its parts are embossed on swell paper, making the visuals in textbooks tactile on Swell Paper,3D printing material describing the life cycle of beans (3D visuals were found on the Internet), 3D pencils used to emboss visuals.

This Swell Paper is a life saver; I can make a table for a student with VI. I can also assure this with a 3D pen. I will definitely get a 3D pen. I can make everything tactile with a 3D pen (Focus Group 1).

5 Discussion

In the current study, learning outcomes of in-service teachers related to inclusive teaching practices in the interdisciplinary collaborative mentoring program during 1 year were examined. The analysis based on learning outcomes of the teachers which refer to changes in their knowledge were grouped under the titles

of "Basic Concepts", "Educational Support and Legislation", "Assistive Technology", and "Practicing Educational Accommodations".

Many studies in the literature related to IE show that teachers' skills and competency levels related to inclusive teaching practices are not at the desired level (e.g. Akalin et al., 2014; Engelbrecht et al., 2015; Jordan, 2018; Metsala & Harkins, 2019). This study also suggests that in-service teachers need to be guided to improve their skills related to IE and collaborative studies are needed including people with diverse backgrounds among various practitioners as several barriers were identified in the implementation of inclusive education. Since teachers lack the required skills to implement IE(Love et al., 2015), collaboration of teachers and university faculty members will work as a way of composing new forms of discourse of teaching and learning (Putnam & Borko, 2000).

According to the results, teachers' conception of disability, inclusion, and accessibility were problematic and they indicated that they even face problems when they are addressing a student in class. Similarly, teachers had misconceptions related to accessibility as a notion; as their accessibility understanding was only limited to the physical accommodations. Therefore, mentors addressed those issues in the panels and they figured out teachers' understanding of those terms progressed an important change. As also mentioned in the literature conceptions related to disability and inclusion is problematic among teachers and faculty members and training programs are suggested in order to transform the target groups' misconceptions (Carballo et al., 2019). Interestingly, as Kilinc (2019) highlighted, understanding teachers' conceptualization of IE is one of the ways to ensure the success of inclusive education.

Based on the results, it can be interpreted that teachers have the motivation for meeting the needs of diverse students, however as they are not informed about the procedures in detail, rules and educational support of diverse needs, they face several challenges which negatively affect the process of inclusive education. The second learning outcome of the teachers is related to the educational support and legislation issues, as they lack the relative information. They indicated that they do not know how to reach the additional required materials for the inclusive student. The other issues they had problems with is related to the instructional accommodations including preparing the IEP and time management problems of the teachers. They thought that separating extra time for an inclusive student is a reason for inability to keep up the curriculum. This issue might be related to their lack of knowledge about the necessary educational accommodations. Mentors conducted a panel covering the general legislation and educational support issues. Teachers indicated during the interviews that they are now familiar with the legislation in Turkey, the rules and the options they have to support the

education of inclusive students. Similarly, literature also emphasized the teachers' difficulties in accessing resources, supports and services (Anglim et al., 2018), preparing IEPs (Aktan, 2020) and the needs of teachers, or faculty members' training related to the rules of the institutions (Gelbar et al., 2015). The workload and time management problems of teachers related to IE practices are also one of the issues observed frequently in the literature (Anglim et al., 2018; Sadioğlu et al., 2013).

The results showed that the other main issue teachers face problems with is related to the AT since they perceive and associate AT as the high technology, which is not affordable to use for them. Thus, mentors expressed the diverse range of the available ATs for students with disability and their usage areas. Teachers demanded more training about the ATs and required them to have personal use experience. Teachers' lack of AT knowledge is a frequent issue mentioned in the literature (Nam et al., 2013; Opie, 2018; Van Laarhoven & Conderman, 2011; Zaph et al., 2016) which affects the accessibility of course content to inclusive students in a negative way. Based on the data it was seen that teachers agreed that AT has a key role in the education of inclusive students, there are several types of AT they can use.

The last learning outcome of the teachers was about practicing educational accommodations related to presenting the content. Teachers indicated that they benefitted from this process widely in learning simple arrangements, designing and developing materials for students with VI. During the process they experienced the usage of AT also. Teachers indicated that, with simple arrangements, it is possible to present the content to the VI without excluding them from the learning process. Additionally, they figured out that it is possible to benefit from the affordances of AT without having technical knowledge and spending extra money. As highly emphasized in the literature, teachers are expected to conduct effective educational accommodations in order to provide students with accessible academic content and being successful in assessments (Rosenberg, Sindelar, & Hardman, 2004).

Conclusion, limitations and further studies

The current study has demonstrated the learning outcomes of the teachers during collaborative mentoring programs, which are also the needs and gaps in the provision of inclusive teaching practices. The current collaborative mentoring study has several contributions for teachers in terms of their knowledge and skills in implementing an effective inclusive education. The positive outcomes of the study are the natural result of the effective collaboration among participants with diverse background who conducted series of professional development activities including seminars, conferences, panels and workshops. Thus, the results of this study point to the needs for more interdisciplinary collaboration

studies in order to support teachers' dealing with diverse students. Using a collaborative mentoring program creates a mentee-centred process, and thus improve inclusive skills of teachers, which is aligned with their needs.

Present study has several limitations. First, the data were collected during a one-year process of interdisciplinary collaborative mentoring program from the teachers who are from different schools in one city of Turkey; therefore, the results of the study are bound to the project duration and the place of the study. Since all of the information related to inclusive teaching practices cannot be provided during a limited time, thus, it was suggested that further collaboration studies should be conducted in order to improve inclusive teaching practices of teachers which also offer ongoing support. One of the assumptions regarding the current study was that the learning outcomes of teachers would lead to more meaningful learning outcomes for students. However, due to the Covid-19 pandemic, the curriculum materials developed could not be implemented by teachers in class since the schools were closed.

The second issue was that AT and accessibility issues are gaining popularity and significance due to the compulsory distance education practices during Covid-19 pandemic. The study concerned the hands-on material development and the environmental and educational accommodations in a face-to-face classroom environment. Thus, further studies are needed in the accessibility training of teachers related to digital content.

The participants of the study included science and classroom teachers. In order to reach more teachers and meet their needs, more studies are needed. Additionally, the second stage of the study concerned the material development related to the students with VI. It is suggested to implement similar studies with other teachers from different fields.

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