



# Investigation of the opinions of pre-service special education teachers on the use of assistive technologies in special education

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## Abstract

Teachers are expected to have sufficient knowledge and skills on assistive technologies in order to use assistive technologies, which are defined as various technological tools and methods that facilitate the lives of individuals with special needs, in the field of education. Considering that this is related to undergraduate education programme in which teachers gain knowledge and skills in their fields. So it is important to consult the opinions and experiences of teacher candidates. The aim of this study, based on this, is to reveal the experiences and opinions of special education teacher candidates about the use of assistive technologies in education. For this purpose, 13 special education teacher candidates who continue their education were interviewed in the study carried out by using the phenomenology method, one of the qualitative research designs. The data obtained with an interview form consisting of 9 questions were analyzed by content analysis. As a result of the research, the participants found the use of assistive technology in special education mostly beneficial, especially the technology-related courses they took in undergraduate education; however, it was observed that they stated that the existing trainings were insufficient.

**Keywords** Assistive technology · Special education · Students with special needs · Pre-service teachers · Phenomenology

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## 1 Introduction

Technological developments have forced many fields to restructure and every field has begun to integrate with technology (Dilber, 2012; Görçün, 2018). It can be said that one of these fields is the field of education. The rapid developments in technology have also found reflections in the field of education in terms of increasing the efficiency of teaching, supporting permanent learning, fostering student achievement and helping students acquire higher-order skills and technology integration in education has become a necessity over time (Dere and Demirci, 2021). One of the most important events accelerating the integration of technology into education has undoubtedly been the Coronavirus Disease 2019 (COVID-19). With the COVID-19 pandemic, there has occurred a remarkable increase in the use of technology in education (Arslan et al., 2022). The use of technology in education is seen to be important for many reasons such as fostering permanence in learning, facilitating learning, supporting the subject, attracting students' attention, providing equal opportunities in education, increasing the brain's perception capacity, making adaptations specific to individual differences, making fair and unbiased scoring with computerized evaluation, learning at one's own pace, facilitating the work of teachers and helping in the organization of the learning environment (Alpar et al., 2007; Uysal-Kara, 2019; Yıldırım et al., 2018). It is also stated to be an important indicator for countries to reach the level of developed countries (Akıncı and Seferoğlu, 2010). Given that the use of technology in education is so essential and important, it can be said that the use of technology in the education of individuals with special needs is also a necessity (Kurt and Kurtoğlu-Erden, 2020).

When the use of technology in the field of special education is investigated in the literature, the concept of assistive technologies is often encountered. Assistive technologies can be defined as various technological tools, methods or possibilities that facilitate the lives of individuals with special needs (Çay et al., 2020). Assistive technologies are divided into three as low-level assistive technologies, mid-level assistive technologies and high-level assistive technologies. They can be defined briefly as follows (Çoklar et al., 2018; Sani-Bozkurt, 2018):

- Low-level assistive technologies are technologies that are frequently encountered in daily life and do not require high-level time, effort and cost. Technologies such as page turning apparatus, pen holding apparatus can be given as examples.
- Mid-level assistive technologies are the most used technologies in the field of special education, which are a kind of transition between low and high level assistive technologies. In other words, they can be defined as technologies that have a higher level interaction with battery or electrical power than low-level assistive technologies. Technologies such as calculator, voice recorder, talking dictionary can be given as examples.
- High-level assistive technologies are technologies that require a high level of time, effort and cost. These are technologies that require software and hardware knowledge, mostly including information and communication technologies.

As can be seen, assistive technologies can have different qualities and functions. In the literature, it is stated by different researchers that assistive technologies are important in terms of enabling individuals with special needs to become independent, increasing their self-confidence, helping them to learn various skills and to do a task again and again (Yıkımsı & Tekinarslan, 2005; Çoklar et al., 2018; Çayve et al., 2020). In addition, it is stated that they are useful for individuals with special needs in terms of social adaptation, academic success, participation in daily life and equal opportunities in education (Akkök, 1984; Sani-Bozkurt, 2017). Moreover, it is stated that they increase the adaptation of individuals with special needs to the environment (Kutlu et al., 2018; Çay et al., 2020). However, the usefulness of these technologies depends on the extent to which special education teachers can use them effectively and on the knowledge and skills they have about assistive technologies (Çay et al., 2020; Kutlu et al., 2018).

Special education teachers have an important role for providing appropriate educational interventions for students who have special needs. Effective educational outcomes from utilization of assistive technologies are dependent on special education teachers' readiness, self-efficacy, and their technological skills. Special education teachers' readiness is very important to use assistive technologies in teaching learning process for solving the problems of students with special needs. Many countries around the world are focusing on approaches to utilize assistive technologies in learning and teaching process to improve the quality of education by emphasizing competencies such as critical thinking, decision-making, handling of dynamic situations, working as a member of a team, and effective communication (Surajudeen et al., 2023; Rwegoshora et al., 2022).

## 1.1 Problem statement and literature review

There are various studies in the literature attempting to reveal the opinions of teachers on assistive technologies. In the study conducted by Yıkımsı and Tekinarslan (2005), the opinions of teachers in special education schools, classrooms and special education and rehabilitation centres about the problems they experienced in the use of assistive technologies and their suggestions for solutions were examined. According to the results of the study, teachers face with a number of bureaucratic obstacles, have problems in acquiring, maintaining and repairing tools, suffer from financial inadequacies and lack of knowledge and skills in using technologies. In another study (Kutlu et al., 2018) in which the opinions of special education teachers on assistive technologies were examined, it was seen that teachers faced problems such as financial inadequacies, lack of knowledge, difficulties in understanding / using technologies and not having sufficient technologies. A similar study by Çay et al. (2020) shows that teachers “*bring their own technological tools and equipment to the classroom due to the lack of technological opportunities*”, “*they do not have content suitable for the development level of the cognitive and motor skills of their students*” and they experience difficulties due to the internet infrastructure of the school. When the findings of these studies are evaluated together, it can be said that there are some problems in the use of assistive technologies in the field of special

education. In order for assistive technologies to be beneficial, they must be used effectively by special education teachers and special education teachers must have sufficient knowledge and skills about assistive technologies (Çay et al., 2020; Kutlu et al., 2018). Moreover, the fact that special education teachers face some problems that may prevent them from using assistive technologies effectively in practice is concerning in terms of the effective and efficient use of assistive technologies in the education of individuals with special needs.

It is seen that it is important for special education teachers to have sufficient knowledge about the use of assistive technologies and to have knowledge about using them effectively. In this context, it is possible to say that there are various factors affecting the competences of teachers. One of the most important of these factors is the education that teachers receive at university (Bausch and Ault, 2012). However, it is stated that the trainings provided on assistive technologies at the undergraduate level generally do not go beyond raising awareness but they should go beyond awareness (Bausch and Ault, 2012). In this sense, it can be said that it may be important to give the courses or lessons related to assistive technologies in a more functional way going beyond raising awareness to pre-service special education teachers during their undergraduate education.

Within the context of the courses given regarding assistive technologies in the undergraduate programs of Special Education Teacher Training programs in Turkey, the following required courses either directly related to or indirectly related to assistive technologies are given; Information Technologies (theoretical 3 class hours), Instructional Technologies (theoretical 2 class hours), Material Design in Special Education (theoretical 1 class hour and practical 2 class hours) and Technology Supported Teaching in Special Education (theoretical 2 h). In addition to these, there are some elective courses given on assistive technologies in these programs; Technology Supported Teaching in Mental Retardation in the area of Mental Retardation (MR), Technology Supported Teaching in Autism Spectrum Disorder in the area of Autism Spectrum Disorder (ASD), Nature of Hearing and Hearing Assistive Technologies in the area of Hearing Impairment (HI) and Assistive Technologies for Visual Disability in the area of Visual Disability (VD) (Higher Education Council [YÖK], 2022). In this sense, it can be stated that in special education teaching undergraduate programs in Turkey, there is only a 2-h theoretical required course—Technology Supported Teaching in Special Education—and that the other directly related courses are elective courses. Therefore, the competences of pre-service special education teachers regarding assistive technologies should be questioned. In addition, it is important to reveal the opinions, needs and problems of pre-service special education teachers and the state of the related courses in imparting competences required for the effective use of assistive technologies within the undergraduate programs. In this context, although there are a limited number of studies in the literature (Çay et al., 2020; Kutlu et al., 2018; Yıkılmış & Tekinarslan, 2005) in which the opinions of special education teachers are investigated, the lack of a national study addressing the opinions of pre-service teachers is the motivation for conducting the current study. Eliciting the opinions of pre-service special education teachers is important in terms of planning the steps to be taken to ensure that they gain the competence to use these technologies in their future professional life, determining their needs

or problems and reflecting them to the education and training services offered in higher education. Therefore, in the current study, it is aimed to get the opinions of pre-service special education teachers on assistive technologies, the use of assistive technologies in special education and the education provided in the undergraduate program on assistive technologies. To this end, the research question of the study is worded as follows:

- What are the opinions of pre-service special education teachers on the use of assistive technologies in special education?

## 2 Method

The method section is discussed under five sub-headings: research design, participants, data collection tool and data collection, data analysis, reliability and validity.

### 2.1 Research design

In the current study, the phenomenological method, one of the qualitative research methods, was employed to elicit the opinions of pre-service special education teachers about assistive technologies. Phenomenological research, one of the qualitative research designs, is a research design in which a subject or situation that is not known in all its depths but that we have an idea about to some extent is examined in depth and a person's perceptions and interpretations of phenomena are revealed (Sığrı, 2018). Creswell (2013) defines it as “research that determines the common meaning of the lived experiences of several people about a phenomenon or concept”. The reason for choosing the phenomenological design in the current study is to examine the opinions of pre-service teachers studying in special education teaching undergraduate programs about the phenomenon of assistive technology.

### 2.2 Participants

It is stated that in phenomenological studies, “*a heterogeneous group whose size varies between 3–4 people and 10–15 people*” should be focused on (Creswell, 2013). The participants of the current study are 13 pre-service special education teachers participating in the study on a volunteer basis. Six of the participants are male and seven of them are female and the great majority of them are 2<sup>nd</sup> and 3<sup>rd</sup> year students and only one of them is 1<sup>st</sup> year student and one of them is 4<sup>th</sup> year student. The ages of the participants range from 18 to 24. It is seen that their perceptions of technological competence are mostly insufficient. While determining the technological competence perceptions of the participants, the following question with three response options (Insufficient – Partially Sufficient – Sufficient) was asked to them; “How competent do you find yourself in using information and communication technologies?” (Table 1) While 11 of the 13 participants stated that they had not studied any other department before, one stated that he/she had studied Nursing and one stated

**Table 1** Information about the Participants

| Participant | Gender    | Grade | Age | TCP          |
|-------------|-----------|-------|-----|--------------|
| P1          | Female    | 1     | 18  | Sufficient   |
| P2          | Female    | 2     | 19  | Insufficient |
| P3          | Female    | 2     | 19  | Insufficient |
| P4          | Male      | 3     | 21  | Sufficient   |
| P5          | Female    | 3     | 21  | Insufficient |
| P6          | Male      | 3     | 20  | Insufficient |
| P7          | Male      | 3     | 21  | Insufficient |
| P8          | Male      | 2     | 22  | Sufficient   |
| P9          | Female    | 3     | 21  | Partially    |
| P10         | Male      | 4     | 24  | Insufficient |
| P11         | Male      | 2     | 19  | Insufficient |
| P12         | Female    | 2     | 21  | Sufficient   |
| P13         | Female    | 2     | 21  | Sufficient   |
| Total       | <b>13</b> |       |     |              |

TCP: Technological Competence Perception

that he/she received education at the National Defence University Military Academy for 3 terms. Information about the participants of the study is given in Table 1.

### 2.3 Data collection tools and data collection

The main data collection method used in phenomenological research is interviews (Sığrı, 2018). Similarly, Creswell (2013) also mentions that the data collection process in phenomenological research includes “*interviews with individuals who have experienced the phenomenon*”. In the current study, an interview form was developed in order to determine the opinions of the pre-service special education teachers. Before the interview form was developed, the existing literature was reviewed. On the basis of this literature review, the draft interview form was created. In order to give the final form to the interview form, it was sent to 2 experts from the field of special education and 1 expert from the field of computer and instructional technologies for expert review. In addition, it was submitted to the review of an expert to check the language and comprehensibility of the interview items. In line with the feedback from the experts, the interview form was given its final form. The interview form was administered to the pre-service teachers via e-mail. Although interviews are mostly preferred for data collection in phenomenological research (Creswell, 2013; Sığrı, 2018), it is stated that this is not an absolute truth and that “other data sources such as poetry, observations and documents” can also be used in some phenomenological studies (Creswell, 2013). In addition, it was thought that since the pre-service teachers had a certain level of education, they could give satisfactory answers to the questions in the interview form in writing. For this purpose, an informative message about the study (purpose of the study, etc.) and the contact information of the researcher (phone, e-mail) were sent to the student groups including pre-service special education teachers. Then, the participants who wanted

**Table 2** Questions in the Interview Form

- 
- 1-) What advantages or disadvantages do you think a special education teacher might have in using assistive technologies?
  - 2-) What training or courses have you taken regarding the use of technology in special education?
  - 3-) What are your opinions on giving training or lessons on the use of technology in special education to pre-service special education teachers?
    - What do you think about its content?
    - What would you say about the incorporation of the “Technology Supported Teaching in Special Education” course, which is included in the special education programs, to the special education programs with the arrangements made?
  - 4-) What assistive technologies do you think you will use when you start teaching?
  - 5-) In the teaching of which skills (social, academic, self-care, etc.) do you think assistive technologies can be used? Why?
  - 6-) For which disorders (visual, hearing, etc.) do you think assistive technologies can be used?
  - 7-) What are your suggestions for more effective use of assistive technologies in special education?
  - 8-) What can be done so that the “Technology Supported Teaching in Special Education” course, which is included in special education programs, can contribute more to pre-service teachers?
  - 9-) Is there anything else you want to add?
- 

to participate in the study voluntarily and reached the researcher were included in the study. A pilot study was conducted on 3 participants who were not included in the study group. In the pilot study, the deficiencies in the interview form were elicited and then corrected by seeking expert opinion again. In line with the feedback received, the interview form was given its final form.

The interview form was sent to the pre-service special education teachers via e-mail in the form of a Word document and their answers were received back in written form as a Word document. Before these interview forms were sent, the participants were informed that everything they would share would be kept confidential and that this information would never be shared with a third party. The questions in the interview form used to determine the opinions of the pre-service special education teachers about assistive technologies are given in Table 2.

## 2.4 Data analysis

The interview forms sent back in writing by the pre-service education teachers were analyzed by using content analysis. According to Yıldırım & Şimşek (2018), content analysis is one of the basic data analysis techniques in qualitative research that enables to reveal the hidden truths behind the data and to reach the concepts that can explain them based on the data.

For the analysis of the data, first, the interview forms from the participants were numbered as P1, P2, ..., P13. Then, both authors transferred these numbered forms to the NVivo 11 program. The forms transferred separately by the authors were analyzed by using the content analysis method. As a result of the coding, the similarities and differences between the authors were examined. According to the examinations, similar codes were brought together. Consensus was reached on the different ones.

In this way, the themes were reached. The findings are presented in the findings section as main themes and sub-themes.

## 2.5 Reliability and validity

It is mentioned that there are eight strategies to be considered in order to ensure validity in qualitative research (Cresswell, 1998). In order to ensure the validity of the current study, attention was paid to the following: The questions of the interview form prepared and used within the scope of the current study were shaped by the expert opinions taken from the researchers who are experts in their fields and have qualitative studies. In addition, the external validity was reinforced by the detailed description of all the activities done during the study. In addition, the findings supporting the researched subject with its positive and negative aspects were included together.

In order to ensure the reliability of the study, the first author and the second author coded the data separately using the NVivo 11 program. Then, themes and sub-themes were created based on these codings. The consistency of the obtained themes and sub-themes with each other was checked, and the themes and sub-themes were finalized by reaching consensus on points of disagreement. The formula “Reliability = Consensus / (Agreement + Disagreement)  $\times$  100” recommended by Miles and Huberman (1994) was used to calculate the reliability between coders. The percentage of reliability obtained with this formula was found to be 92%.

## 3 Findings

Within the context of the current study, a total of 9 main themes and 13 sub-themes were reached. The findings are presented in tables in this section based on the main theme and sub-themes.

### 3.1 Opinions of the pre-service special education teachers on the use of assistive technologies in special education

The sub-themes related to the main theme of the use of assistive technologies in special education and the codes within these themes are presented in Table 3, Table 4 and Table 5.

**Table 3** Sub-Themes within the Main Theme of the Use of Assistive Technologies in Special Education

| Sub-Theme     | f  |
|---------------|----|
| Advantages    | 28 |
| Disadvantages | 8  |
| Total         | 36 |

**Table 4** Codes within the Sub-Theme of Advantages

| Codes                                                           | f         |
|-----------------------------------------------------------------|-----------|
| Facilitates Learning                                            | 6         |
| Helps Draw Attention                                            | 4         |
| Supports with Materials                                         | 3         |
| Helps Teach Faster                                              | 3         |
| Provides Alternatives in Education                              | 2         |
| Makes Teaching Fun                                              | 2         |
| Ensures Retention and Generalization                            | 2         |
| Generates Rich Content                                          | 2         |
| Provides Opportunity to Revise without Getting Help from Anyone | 1         |
| Technology is Required by the Age                               | 1         |
| Increases the Self-Confidence of Individuals with Special Needs | 1         |
| Is Useful for Individuals with Autism Spectrum Disorder         | 1         |
| <b>Total</b>                                                    | <b>28</b> |

**Table 5** Codes within the Sub-Theme of Disadvantages

| Codes                                                | f        |
|------------------------------------------------------|----------|
| High Cost                                            | 3        |
| Interruptions in Education Due to Technical Problems | 2        |
| Lack of Information on How to Use                    | 1        |
| Lack of Necessary Infrastructure                     | 1        |
| Prevention of Creation                               | 1        |
| <b>Total</b>                                         | <b>8</b> |

As seen in Table 3, the majority of the pre-service special education teachers stated that the use of assistive technologies in special education provides advantages. The codes obtained for these advantages are given in Table 4.

In Table 4, the main codes emerging in the sub-theme of advantages are facilitating learning, helping draw attention, teaching faster and supporting with materials. Below are given sample excerpts from the statements of participants for this sub-theme:

*“I think there are great advantages for a special education teacher to use assistive technologies. The reason is that since different education methods are tried for individuals with special needs, the variety of assistive technologies in this education will help and facilitate education” [P3]. “With the use of assistive technologies by a special education teacher, the information to be taught to the individual with special needs can be taught more quickly and easily” [P6].*

The codes obtained for the sub-theme of disadvantages are presented in Table 5.

As can be seen in Table 5, the code of “high cost” of assistive technologies comes to the fore. Below are given sample excerpts from the statements of participants for this code:

*“...These technologies are costly, not easily accessible to everyone and ...”* [P6]. *“...there may be a budget problem for the family of the individual to be taught, and ...”* [P9]. *“The disadvantage is that they kill creativity because we can make very effective tools with even the smallest materials”* [P11].

### 3.2 Opinions of the pre-service special education teachers on the use of assistive technologies in special education

The sub-themes related to the main theme of courses / trainings taken on the use of technology in special education and the codes within these sub-themes are presented in Table 6 and Table 7.

As seen in Table 6, the majority of the pre-service special education teachers stated that they took a course / training on the use of technology in special education. The codes obtained related to these courses / trainings are presented in Table 7.

Table 7 shows that the main codes emerging within the sub-theme of having taken a related course are technology supported teaching in special education and instructional technologies. Below are given sample excerpts from the statements of participants for this sub-theme:

*“As far as I remember, technology and material design, technology-supported teaching in special education...”* [P10]. *“I took the technology-supported teaching in special education and instructional technologies courses”* [P4].

The sub-theme of not having taken a course in Table 6 refers to those who stated that they didn’t take any course / training on the use of technology in special

**Table 6** Sub-Themes within the Main Theme of Courses / Trainings Taken on the Use of Technology in Special Education

| Sub-Themes                        | f  |
|-----------------------------------|----|
| Having Taken a Related Course     | 8  |
| Not Having Taken a Related Course | 5  |
| Total                             | 13 |

**Table 7** Codes within the Sub-Theme of Having Taken a Related Course

| Codes                                                               | f  |
|---------------------------------------------------------------------|----|
| Technology Supported Teaching in Special Education                  | 7  |
| Instructional Technologies                                          | 2  |
| It was a Bit Mentioned within a Special Education lessons           | 1  |
| Instructional Technologies and Material Design in Special Education | 1  |
| Total                                                               | 11 |

education and as these pre-service teachers gave answers such as “I didn’t”, “No” and “Yes”, no excerpts were taken from the statements of these pre-service teachers.

### 3.3 Opinions of the pre-service special education teachers on giving courses on the use of technology to pre-service special education teachers

The sub-themes related to the main theme of giving courses on the use of technology to pre-service special education teachers and the codes emerging within these themes are presented in Table 8, Table 9, Table 10 and Table 11.

As seen in Table 8, the pre-service special education teachers mostly ( $f=16$ ) expressed positive opinions about giving courses on the use of technology to pre-service special education teachers. Codes obtained for the positive opinions are presented in Table 9.

In Table 9, the main codes within the sub-theme of positive are; technology is the requirement of the age and making it possible for pre-service teachers to be more qualified. Below are given sample excerpts from the statements of participants for this sub-theme:

*“The use of technology is very important and since we are now in the age of technology, every teacher must keep up with the age because technology attracts*

**Table 8** Sub-Themes within the Main Theme of Giving Courses on the Use of Technology to Pre-service Special Education Teachers

| Sub-Theme                | f  |
|--------------------------|----|
| Positive                 | 16 |
| Negative                 | 4  |
| Content of the Course(s) | 17 |
| Total                    | 37 |

**Table 9** Codes within the Sub-Theme of Positive

| Codes                                                                   | f  |
|-------------------------------------------------------------------------|----|
| Technology is the Requirement of the Age                                | 8  |
| Making it Possible for Them to be More Qualified                        | 4  |
| Its Importance for Special Education is Great / It Has Positive Effects | 2  |
| Making the Provision of More Efficient Education Possible               | 2  |
| Total                                                                   | 16 |

**Table 10** Codes within the Sub-Theme of Negative

| Codes                                         | f |
|-----------------------------------------------|---|
| The Number of the Courses Should be Increased | 2 |
| Developing Technology Rather Than Materials   | 1 |
| Lessons Should not be Taught Superficially    | 1 |
| Total                                         | 4 |

**Table 11** Codes within the Sub-Theme of the Content of the Course(s)

| Codes                                                                                 | f  |
|---------------------------------------------------------------------------------------|----|
| Their Being More Detailed                                                             | 4  |
| Inadequate Information                                                                | 3  |
| No Information on the Content of the Courses                                          | 2  |
| Up-to-date and New Technologies Should be Included                                    | 2  |
| Sufficient and Suitable                                                               | 2  |
| Developing Technology Rather Than Materials                                           | 1  |
| Information about the Fact That It Should be Adapted for Individuals                  | 1  |
| Giving the Opportunity to Meet with People Who Produce Various Assistive Technologies | 1  |
| Presenting Past Useful Technologies and Current Technologies Together                 | 1  |
| Total                                                                                 | 17 |

*the attention of children” [P5]. “In the age we live in, it would be absurd not to have such courses. I think that by means of the activities that special education teachers will do in the classroom using technology, a more efficient education will be offered. For this reason, I am happy with the lessons we take on the use of technology” [P4].*

The codes obtained for the sub-theme of negative are presented in Table 10.

As can be seen in Table 10, the code of increasing the number of courses comes to the fore in the sub-theme of negative. Below are given sample excerpts from the statements of participants for this sub-theme:

*“It will be more beneficial if the credits and the number of courses on the use of technology are increased, and if these courses are not taught superficially” [P7]. “More courses should be given. The amount of information on technology should be increased in the content of the courses” [P5].*

The codes obtained within the sub-theme of the content of the course(s) given are presented in Table 11.

As seen in Table 11, the main codes emerging within the sub-theme of the content of the course(s) are; their being more detailed and inadequate information. Below are given sample excerpts from the statements of participants for this sub-theme:

*“When I look at the content of the course, I see that it is full of old information because many new assistive applications are coming out every day and it is a pity not to see them in the course content” [P4]. “In fact, I have not seen a great change in terms of content, I have seen the technological developments of the materials used in special education in general, that’s all” [P10].*

### 3.4 Opinions of the pre-service special education teachers on the technologies they consider using when they start the teaching profession

The sub-themes related to the main theme of technologies that the pre-service special education teachers consider using when they start the teaching profession and the codes within these sub-themes are presented in Table 12.

As can be seen in Table 12, the great majority of the pre-service special education teachers stated that they would use assistive technologies at a high level ( $f=37$ ) when they start the teaching profession. The codes that come to the fore within this sub-theme are computer, tablet and smart board. Below are given sample excerpts from the statements of participants for this sub-theme:

*“If I need a computer, I think I can use tablets and Microsoft programs”*  
[P10]. *“It changes depending on the opportunities to be provided by the*

**Table 12** Sub-Themes and Codes within the Main Theme of the Technologies the Pre-service Special Education Teachers Consider Using When They Start the Teaching Profession

| Sub-Theme    | Codes                                                                   | f  |
|--------------|-------------------------------------------------------------------------|----|
| High Level   | Computer                                                                | 9  |
|              | Tablet                                                                  | 9  |
|              | Smart Board                                                             | 6  |
|              | Mobile Phone                                                            | 3  |
|              | Mobile Applications                                                     | 2  |
|              | Digital Books                                                           | 2  |
|              | Smart Watches                                                           | 2  |
|              | Visual Reality Applications                                             | 2  |
|              | Various Software Programs                                               | 1  |
|              | Microsoft Office programs                                               | 1  |
| Medium Level | Voice Recorders                                                         | 3  |
|              | Talking Dictionaries                                                    | 1  |
|              | Timers                                                                  | 1  |
|              | Speech Generating Tools                                                 | 1  |
|              | Projector                                                               | 1  |
|              | Reading Pen                                                             | 1  |
| Low Level    | Visual Cards                                                            | 1  |
|              | Magnifiers                                                              | 1  |
|              | Braille                                                                 | 1  |
| Others       | Determining According to the Needs of Students                          | 5  |
|              | Determining According to the Opportunities to be Provided by the School | 2  |
|              | Self-Renewal According to Developments                                  | 1  |
|              | Organization Tools                                                      | 1  |
|              | Technologies to Overcome Physical Constraints                           | 1  |
| Total        |                                                                         | 58 |

*school I will attend, if there is a smart board in the classroom where I will teach, I will use smart boards and computers, but if I am going to teach in a school with fewer opportunities, I prefer to use a computer and mobile phone” [P4].*

In Table 12, it is seen that the code that comes to the fore within the sub-theme of medium level is voice recorders. In addition, it is seen that the codes that come to the fore within the sub-theme of low level are visual cards and magnifying glasses. Below are given sample excerpts from the statements of participants for these sub-themes:

*“It could be reading magnifiers, talking dictionaries, speech-generating tools ....” [P3]. “... projector, voice recorder ...” [P6].*

In Table 12, it is seen that the code that comes to the fore within the sub-theme of others is determining according to the needs of students. Below are given sample excerpts from the statements of participants for this sub-theme:

*“The materials change depending on the characteristics of the disability group I will work with” [P7]. “I can use one or more of low, medium or high technologies according to the needs of the individual being educated” [P19].*

### 3.5 Opinions of the pre-service special education teachers on skills that can be supported with assistive technologies

The codes emerging within the theme of skills that can be supported with assistive technologies are presented in Table 13

As seen in Table 13, the codes that come to the fore within the theme of skills that can be supported with assistive technologies is all skills. Below are given sample excerpts from the statements of participants for this sub-theme:

*“Assistive technologies can also be used to support the development of many skills that students lack. For example, a visually impaired student can access many features on his/her device through an application installed on his/her mobile phone” [P1].*

**Table 13** Codes within the Theme of Skills That can be Supported with Assistive Technologies

| Codes            | f  |
|------------------|----|
| All Skills       | 8  |
| Social Skills    | 4  |
| Academic Skills  | 4  |
| Language Skills  | 1  |
| Self-Care Skills | 1  |
| Total            | 18 |

*“More emphasis on social and academic skills” [P2].*

### 3.6 Opinions of the pre-service special education teachers on the types of disability that can be supported with assistive technologies

The codes within the theme of types of disability that can be supported with assistive technologies are presented in Table 14.

As seen in Table 14, the codes that come to the fore within the theme of types of disability that can be supported with assistive technologies are all types of disability, visual disability and hearing impairment. Below are given sample excerpts from the statements of participants for this sub-theme:

*“They can be used in every type of disability because there are applications that are used efficiently and actively in the internet environment for every type of disability and through these applications, students can be helped to overcome their difficulties” [P8].*

*“They can be used for visual disability like (audio readers) ...” [P3].*

### 3.7 Findings related to the pre-service special education teachers’ suggestions for the effective use of assistive technologies in special education

The codes within the theme of suggestions for the effective use of assistive technologies in special education are presented in Table 15.

As seen in Table 15, the codes that come to the fore within the theme of suggestions for the effective use of assistive technologies are improving the technological competence of teachers, provision of the adequate financial support by the state, use of effective methods, conducting more informative activities such as a conference on the subject and adapting assistive technologies according to disability types. Below are given sample excerpts from the statements of participants for this sub-theme:

*“I would like the teachers who will use these tools to be adequately informed about them” [P11].*

**Table 14** Codes within the Theme of Types of Disability That Can Be Supported with Assistive Technologies

| Codes                       | f  |
|-----------------------------|----|
| All Types of Disability     | 8  |
| Visual Disability           | 5  |
| Hearing Impairment          | 5  |
| Physical Disability         | 2  |
| Autism Spectrum Disorder    | 2  |
| Mental Retardation          | 2  |
| Special Learning Difficulty | 1  |
| Giftedness                  | 1  |
| Total                       | 26 |

**Table 15** Codes within the Theme of Suggestions for the Effective Use of Assistive Technologies

| Codes                                                                      | f  |
|----------------------------------------------------------------------------|----|
| Improving the Technological Competence of Teachers                         | 4  |
| Provision of the Adequate Financial Support by the State                   | 2  |
| Use of Effective Methods                                                   | 2  |
| Conducting More Informative Activities such as a Conference on the Subject | 2  |
| Adapting Assistive Technologies According to Disability Types              | 2  |
| Individualized Instruction                                                 | 1  |
| More Effective Delivery of Lessons                                         | 1  |
| Increasing the Studies on the Subject                                      | 1  |
| Teaching about the Areas of Use                                            | 1  |
| Informing or Training the Parents of Students                              | 1  |
| Increasing the Competence of Faculty Members                               | 1  |
| Teaching Systematically                                                    | 1  |
| Giving Practical Trainings to Pre-service Teachers                         | 1  |
| Pre-service Teachers' Improving Themselves in Technology                   | 1  |
| Ensuring Teacher and Parent Cooperation                                    | 1  |
| Informing About Its Importance                                             | 1  |
| Increasing the Number of Courses on Technology                             | 1  |
| Following Innovations and Research                                         | 1  |
| Bringing High Prices to Reasonable Levels                                  | 1  |
| Total                                                                      | 26 |

*“The state should provide the required materials to all people and institutions that are in need of these materials” [P10].*

### **3.8 Findings related to the pre-service special education teachers' suggestions for the “technology supported teaching in special education” course to contribute more to pre-service teachers**

The codes within the theme of suggestions for the “Technology Supported Teaching in Special Education” course to contribute more to pre-service teachers are presented in Table 16.

As seen in Table 16, the codes that come to the fore within the theme of suggestions for the “Technology Supported Teaching in Special Education” course to contribute more to pre-service teachers are giving practical trainings and improving the content of the course. Below are given sample excerpts from the statements of participants for this sub-theme:

*“Not only theoretical but also practical knowledge should be given” [P11].*

*“More detailed information can be given on topics such as how technological materials are used, what they do and what effect they have on each disability group” [P7].*

**Table 16** Codes within the Theme of Suggestions for the “Technology Supported Teaching in Special Education” Course to Contribute More to Pre-service Teachers

| Codes                                                                                 | f  |
|---------------------------------------------------------------------------------------|----|
| Giving Practical Trainings                                                            | 10 |
| Improving the Content of the Course                                                   | 2  |
| Seminars by Field Experts                                                             | 1  |
| Giving the Opportunity to Meet with People Who Produce Various Assistive Technologies | 1  |
| Involving More Technological Developments                                             | 1  |
| More Effective Delivery of Lessons                                                    | 1  |
| Issuance of Training Certificates                                                     | 1  |
| Giving Assignments                                                                    | 1  |
| Increasing the Competence of Faculty Members on the Course                            | 1  |
| Supporting Universities to Have Better Opportunities                                  | 1  |
| Total                                                                                 | 20 |

*“The faculty member who teaches the course needs to know the content of the course well, for this reason, I believe that the lessons will be productive with a more knowledgeable teacher” [P4].*

#### 4 Discussion, conclusion and suggestions

Within the context of the current study, the opinions of the pre-service special education teachers on assistive technologies, the use of assistive technologies in special education and the education given in the undergraduate program on assistive technologies were investigated. It was determined that the pre-service teachers have mostly positive opinions about assistive technologies, but they have negative opinions about the content of the education they receive at universities and the way it is delivered. In the study conducted by Bahceci (2019) to determine the attitudes of teachers working in the field of special education towards assistive technologies and their individual innovativeness levels, it was concluded that teachers working in the field of special education exhibit positive attitudes towards assistive technologies. As a result of another study (Sertkaya, 2021), which aimed to examine the self-efficacy and attitudes of special education teachers towards the use of technology and assistive technology in their classrooms depending on different variables, it was found that teachers’ self-efficacy regarding the standards of educational technology is high and their attitudes towards assistive technologies are positive. In the study conducted by Aslan (2018) to examine the attitudes of special education teachers towards assistive technologies, it was determined that the attitudes of special education teachers towards assistive technologies are generally positive. In a similar study (Miliazim-Memet and Şentürk, 2021) conducted to examine the attitudes of special education teachers towards the use of assistive technology, it was concluded that special education teachers are willing to use assistive technologies in their lessons based on their attitudes towards the use of assistive technologies. Thus, it can be said that the findings of this study and the findings of similar studies in the literature are

consistent. In addition, Sakallı-Demirok et al. (2019) conducted a study to determine the attitudes of special education teachers towards the use of assistive technologies and concluded that teachers' attitudes towards assistive technologies are neither positive nor negative. For this reason, it can be said that there are also findings that do not concur with the literature.

The pre-service teachers stated that using assistive technologies in special education would mostly provide advantages. It is seen that the prominent ones among these advantages are facilitating learning, attracting attention, supporting with materials and teaching faster. In the study conducted by Eser and Gözler (2020), according to the opinions of primary teachers, it was concluded that the use of educational technologies in the classroom environment facilitates the work of teachers for reasons such as increasing students' interest in the lessons and embodying abstract subjects. As a result of the study conducted by Çay et al. (2020) to determine the experiences and opinions of special education teachers working in special education schools on the use of assistive technologies, it was determined that teachers generally use assistive technologies to better convey the subject to students, to reinforce what has been studied at the end of the lesson and to embody the subject taught in the lesson. In addition, according to special education teachers, the advantages of using technology in the classroom are concretizing the taught subject, increasing the interaction time of the student with the teacher, preparing the student for the lesson and attracting attention, facilitating the teaching, ensuring the active participation of the student, increasing the attention span of the student and enabling the student to develop positive attitudes towards the lesson. Thus, it can be said that the findings of this study and the findings of the studies in the literature concur with each other.

Regarding the disadvantages of using assistive technologies in special education, the high cost of assistive technologies and the disruption of education due to technical problems came to the fore. In addition, it was determined that its requiring knowledge to use, the necessity of providing the necessary infrastructure and preventing creativity emerged as disadvantages. In the study conducted by Kutlu et al. (2018), the use of assistive technologies by teachers working in the field of special education is mostly affected by factors such as the cost and complexity of assistive technologies, the lack of sufficient assistive technologies for students at school, lack of information about assistive technologies and the lack of technical support for assistive technologies at schools. In the study conducted by Çay et al. (2020), special education teachers stated that they have problems in the use of technology in special education due to the lack of internet connection, the inadequacy of the school's internet infrastructure and the limitations in the motor and cognitive skills of their students. Accordingly, it can be said that the majority of what the pre-service special education teachers participating in the current study expressed as a disadvantage emerges as a problem in the studies conducted on special education teachers in the literature. For this reason, it can be said that the opinions of the pre-service special education teachers and the problems in the real practice area and the studies in the literature are consistent. On the other hand, in the study conducted by Eser and Gözler (2020), it was concluded that educational technologies do not prevent teacher and student creativity, rather, they benefit them. Accordingly, it can be stated that this finding contradicts the findings of the current study.

It was determined that the majority of the participants took a course on the use of technology in special education. Most of the participants stated that they took the Technology Supported Teaching in Special Education and Instructional Technologies courses. It was determined in the study conducted by Çay et al. (2020) that the participants of the study were special education teachers with an average age of 35, and they had not taken any courses on the use of technology in special education during their undergraduate years. In addition, it was revealed that although some participants did not take courses on the use of technology in special education, they generally took courses on the use of technology in education. This difference between the findings can be explained by the addition of Technology Supported Teaching in Special Education course to the special education undergraduate programs implemented as of the 2016–2017 academic year (Özdemir, 2018). In addition, the presence of such courses on the use of technology in special education may positively affect the use of assistive technologies by pre-service special education teachers when they start their professional life. In fact, in the study conducted by Aslan (2018) to examine the attitudes of special education teachers towards assistive technologies, it was determined that teachers who took courses on assistive technology had higher attitudes towards assistive technologies. Similarly, in the study conducted by Miliazim-Memet and Şentürk (2021), it was concluded that special education teachers who received in-service training on assistive technologies had a more positive attitude towards the use of assistive technologies than those who did not. In the literature, it is stated that special education teachers who have a positive attitude towards the use of assistive technology have a higher tendency to use these technologies in classroom teaching activities (Aslan, 2018). This reveals the importance of giving courses on the use of technology in special education in special education undergraduate programs. In the current study, the pre-service teachers mostly evaluated positively that they were given a course on the use of technology. It was seen that the prominent ones among these positive opinions are that technology is the necessity of the age and that it enables pre-service teachers to be more qualified. On the other hand, they expressed negative opinions on the inadequacy of technology-related courses, the fact that the course contents are given superficially and development on the basis of technology rather than materials. Regarding the content of the course(s) they took, they mostly expressed that they should be more detailed and that they contain insufficient information.

The pre-service special education teachers stated that they would use more high-level technologies such as computers, tablets and smart boards when they started the teaching profession. In the study conducted by Kutlu et al. (2018), approximately 66% of teachers working in the field of special education stated that they do not use high-level assistive technologies, while 26% stated that they use high-level assistive technologies only a few times a week. As a result of the study conducted by Çay et al. (2020) to determine the experiences and opinions of special education teachers working in special education schools on the use of assistive technologies, it was determined that teachers mostly use computers, laptop computers and mobile phones in education. In the study conducted by Eser and Gözler (2020), it was concluded that the technologies most used by primary teachers in their classrooms are projectors, videos and picture-graphic displays. In this sense, it can be said that there

are both studies reporting results consistent with the results of the current study and studies reporting findings not consistent with the results of the current study. In addition, in the systematic review conducted by Serttaş et al. (2020) on the studies focused on the use of technology in special education, it was determined that the most used assistive technologies are Kinect technologies. Thus, it can be said that researchers and practitioners mostly think of high-level technologies when it comes to the use of assistive technologies in the field of special education. One reason for this may be that the relevant stakeholders do not have sufficient knowledge about assistive technologies (Çay et al., 2020). However, there may be many more reasons for this situation.

The pre-service teachers stated that assistive technologies that they least consider using are mostly medium and low-level technologies such as various software, Microsoft office programs, talking dictionaries, timers, speech generating tools, projectors, reading pens, visual cards, magnifying glasses and Braille when they start their teaching career. In the study conducted by Eser and Gözler (2020), it was found that the technologies that primary teachers use the least in their classrooms are smart boards, web page links and internet browsing software. Accordingly, this finding of the current study does not concur with the literature. One reason for this may be that the participants of the current study were pre-service teachers, while the participants of the other study were teachers. In addition to this, another reason is that while the pre-service special education teachers were included in the current study, there may be a difference between their branch and the branch of the primary teachers included in the other study. In addition to all these, some of the pre-service special education teachers stated that they would determine the assistive technologies they would use according to the needs of the students. Given the importance of individual differences in the field of special education and adaptations to be made for the individual, it can be mentioned that this rate is quantitatively low. This situation can be explained by the fact that the pre-service special education teachers do not have full knowledge of assistive technologies or they cannot fully gain the perspective required by the field of special education. This argument is strengthened especially when it is considered that the majority of the participants of the current study are second and third year students.

Approximately 54% of the pre-service special education teachers described themselves as technologically insufficient, 8% as partially sufficient and 38% as sufficient. In the study conducted by Yıkımlı and Tekinarslan (2005), it was concluded that teachers do not have sufficient knowledge and skills on the use of technology in special education. In the study conducted by Kutlu et al. (2018), approximately 41% of teachers working in the field of special education stated that they were not satisfied with their current knowledge and skills about assistive technologies, while 60% stated that they were moderately or very satisfied. Accordingly, it can be said that the findings of the current study and the findings in the literature are parallel. In addition, the fact that most of the pre-service special education teachers and teachers working in the field of special education do not feel competent about assistive technologies can be considered as an important problem because, as stated before, it has been pointed out that teachers who take courses or training on this subject have positive attitudes towards assistive technologies (Aslan, 2018; Miliazim-Memet &

Şentürk, 2021) and this paves the way for the use of assistive technologies in classroom activities. Therefore, similarly, the pre-service special education teachers' feeling inadequate about technology may cause them to develop negative attitudes towards assistive technologies and, accordingly, not to include assistive technologies in their classroom activities. In the study conducted by Bahceci (2019), it was revealed that teachers who find themselves sufficient to benefit from assistive technologies exhibit more positive attitudes towards using assistive technologies. Similarly, it was found that teachers who think that their technology education level is good have a more positive attitude towards using assistive technologies than teachers who think that they are moderate or inadequate. Seen From this perspective, it can be said that the inadequacy of pre-service special education teachers about technology may overshadow their use of assistive technologies in their classrooms in the future teaching profession. In addition, when the findings such as the fact that the majority of the pre-service special education teachers see themselves as technologically incompetent within the scope of this study and that they see the courses given on the use of technology in special education as insufficient in terms of content and number, it can be thought that they may face similar problems in their professional lives.

Regarding the skills that can be supported by assistive technologies, most of the pre-service teachers (62%) stated that all skills can be supported by assistive technologies, followed by the pre-service teachers stating that social skills can be supported (31%) and academic skills (31%). In the study conducted by Çay et al. (2020), it was determined that special education teachers generally evaluated the use of assistive technologies within the scope of teaching academic skills. In this sense, it can be said that the findings of the current study and the findings in the literature show some similarities. Considering that assistive technologies can be used to support various skills and are effective in different skill areas, it can be concluded that some pre-service teachers have insufficient knowledge in terms of assistive technologies, their usage areas and effectiveness (Çay et al., 2020).

Regarding the types of disability that can be supported by assistive technologies, the pre-service special education teachers mostly (62%) expressed that all types of disability can be supported by assistive technologies, followed by visual disability (38%) and hearing impairment (38%).

Suggestions made by the pre-service special education teachers for more effective use of assistive technologies in special education include increasing the technology competence of special education teachers, provision of sufficient financial support by the state, their use with effective methods, conducting more informative activities such as conferences on the subject and adapting assistive technologies according to the types of disability. In the study conducted by Yıkılmış and Tekinarslan (2005), it was stated that some of the main problems regarding the use of technology in private education institutions are the lack of sufficient budget, the lack of sufficient knowledge and skills of teachers on the use of technology in special education and the bureaucratic barriers to technology purchase in public schools. As a result of the study conducted by Çay et al. (2020), it was determined that schools and classrooms lack technological equipment and that teachers bring their own personal tools and equipment. In order to solve these problems, the teachers stated that the concerned

authorities should support the schools where individuals with special needs are educated, both in terms of material and financial support. When the findings of the studies are evaluated together, it can be said that the suggestions made by the pre-service special education teachers in the current study concur with the problems in the use of technology in special education. Moreover, it can be stated that the suggestions such as provision of sufficient financial support by the state and conducting more informative activities such as conferences on the subject are consistent with the literature. From this point of view, it can be said that the suggestions made by the pre-service special education teachers in this study may be important in overcoming the problems in practice.

The pre-service special education teachers suggested that the Technology Supported Instruction in Special Education course contributes more to the special education teachers and they mostly suggested that practical training should be given (77%) and the course content should be improved (15%). In the study conducted by Kutlu et al. (2018), it was stated that updating special education teacher training programs would be important. In the study conducted by Sertkaya (2021), it was suggested that special education teachers should be given practical training on technology and / or assistive technologies in accordance with the objectives in the special education curriculum. In addition, it was suggested that by determining the problems experienced by special education teachers in the application of technology / assistive technologies, personnel qualified enough to provide technological support for them to overcome these problems should be recruited. On the other hand, Çay et al. (2020) suggested that special education teachers should be given practical in-service training on technology and that pre-service special education teachers should be given practical training in addition to theory in the Technology Supported Teaching in Special Education and Material Development courses they took in their undergraduate education. When the findings of the studies in the literature are evaluated together, it is seen that the lack of knowledge of special education teachers about assistive technologies in practice causes various problems in their professional lives and it can be suggested that these problems can be overcome with in-service trainings or that future teachers can be helped to overcome such problems by updating the teacher training undergraduate programs. In this sense, it can be said that the findings of the current study are in parallel with the literature.

## 5 Suggestions

In light of the findings of the current study, the following suggestions can be made:

- On the basis of the results obtained from the current study and the literature, it was determined that the use of assistive technologies in the education of individuals with special needs has advantages such as increasing their attention and enabling them to learn more easily. Accordingly, it can be suggested that pre-service special education teachers be encouraged to use technology, especially during their undergraduate education and that they should be given practice-

oriented assignments and tasks such as asking them to teach various objectives using assistive technologies.

- As a result of the study, it was concluded that the opinions of the pre-service special education teachers regarding the disadvantages of using assistive technologies include the high costs of the use of assistive technologies, the disruption of education due to technical problems, the requirement of having knowledge on how to use them and the lack of necessary infrastructure and these seem to be problems experienced in real classroom environment. For this reason, it can be suggested that the number of assistive technologies that can be used freely in the field of special education should be increased, that the personnel who can provide technical support for assistive technologies should be recruited, that assistive technology laboratories should be established by providing various assistive technologies to universities, that pre-service special education teachers should be informed about the technical features of various assistive technologies during their undergraduate education and that policy makers should take the necessary initiatives to provide the infrastructure for assistive technologies. Moreover, it was observed that a pre-service special education teacher stated that assistive technologies hinder the creativity of students with special needs, contrary to the literature. Thus, it may be suggested to make necessary updates in special education undergraduate programs and to add relevant contents to the relevant courses. In this way, pre-service teachers can be prevented from forming prejudices against assistive technologies.
- While the pre-service special education teachers positively evaluated the fact that they were taught about the use of technology in their undergraduate education, they also expressed a negative opinion in terms of the low number of courses, the superficial content of the courses and the content only related to the use of materials. Accordingly, it can be suggested that the number of courses related to the use of assistive technologies in special education undergraduate programs should be increased, the course content should be improved to meet the needs and the content of the courses should be organized in such a way to include high-level assistive technologies.
- According to the common findings of the current study and various studies in the literature, it was determined that the participants mostly mentioned high-level assistive technologies for the assistive technologies they use / will use. A new study can be conducted to reveal whether this situation is due to the lack of knowledge on the subject or whether it is related to the attitude developed.
- The results of the current study and studies in the literature revealed that a large part of pre-service special education teachers and teachers working in the field of special education do not feel competent about assistive technologies. Given that pre-service teachers' feeling inadequate about technology may cause them to develop negative attitudes towards assistive technologies and accordingly not to include assistive technologies in classroom activities, it can be suggested to increase the number and quality of technology-related courses in special education undergraduate programs.
- Although assistive technologies can be used to support various skills and can be effective in different skill areas, it was concluded that the pre-service

teachers mostly expressed that they would be used to support social and academic skills. Various studies can be planned to reveal the reasons for this situation, and as a result, if there is a lack of knowledge of pre-service teachers in terms of assistive technologies, their usage areas and effectiveness, remedial measures should be taken. These measures should be reflected in the relevant courses in special education undergraduate programs. Furthermore, it may be suggested that the instructors who teach the relevant course / courses on assistive technologies include information and sample applications on how assistive technologies can be used to support various skill areas.

- It was determined that the pre-service teachers mostly stated that all types of disability can be supported with assistive technologies. However, it was seen that the great majority of the pre-service teachers expressed that individuals with visual disorder and hearing impairment can be supported. New research can be done to reveal the reason for this situation. In addition, it may be suggested that the instructors who teach the relevant course/courses on assistive technologies include information and sample applications on how assistive technologies can be used to support various types of disability.
- It was concluded that the suggestions made by the pre-service special education teachers for more effective use of assistive technologies in special education concur with the problems identified in the literature on the use of technology in special education. Accordingly, it can be said that the suggestions made by the pre-service education teachers in this study may be important in terms of overcoming the problems in practice and each one should be considered separately. Thus, it can be suggested to increase the technological competence of special education teachers, to provide sufficient financial support by the state, to use assistive technologies with effective methods, to conduct more informative activities such as conferences on the subject, to adapt assistive technologies according to the types of disability, to conduct undergraduate courses more effectively, to deliver one-to-one teaching, to increase the number of studies on assistive technologies, to teach their areas of usage, to organize trainings for families on this subject, to increase the competence of the instructors, to deliver courses in a systematic manner, to give practical training to pre-service teachers, to strengthen the cooperation between teachers and parents on the subject, to provide information on the importance of assistive technologies, to increase the number of technology-related courses, to follow current research and innovations and to reduce costs.
- Finally, based on the fact that the pre-service special education teachers found the content of technology-related courses superficial, incomplete and theoretical and their opinions about developing the technological competence of instructors and that the field of special education is an interdisciplinary field, it can be suggested that people specialized in the field of technology should be supported to advance in the field of special education and thus to reflect their expertise to the field.

**Data availability** The datasets generated during and/or analysed during the current study are available from the authors on reasonable request.

## Declarations

**Conflict of interest** None.

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