

Special Education Teacher Candidates' Metaphoric Perceptions of Technology-Assisted Instruction

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SUMMARY

This study aims to determine the metaphors created by teacher candidates for technology-assisted instruction in special education. This is a descriptive study, which was conducted in survey model. The study group consisted of 138 volunteer teacher candidates studying at the second, third and fourth grades of the Special Education Department. Teacher candidates' metaphors about the use of technology in special education were created online collected with a questionnaire. In order to reveal the metaphors of teacher candidates for technology-assisted teaching in special education, sentences such as "To me, technology-assisted teaching in special education are like; because,". The content analysis technique in the research was used for data analysis. Teacher candidates of the Department of Special Education have produced 56 metaphors about the use of technology in special education. These metaphors are grouped according to their common features and grounds for use. The grouping study, metaphors were collected under six different categories. The metaphors created by the teacher candidates were visualized using figures and tables, categorized, and explained using direct quotes from the participants' reasoned explanations. It is observed that the metaphors of water, key and compass were used frequently about the technology-assisted teaching in special education. Among these metaphors, water has been repeated 15 times and became the most used metaphor by teacher candidates, while key and compass have been repeated seven times. It is concluded that teacher candidate' perceptions of technology-assisted teaching in special education are generally positive.

Keywords: Special education, teacher candidate, metaphor, metaphorical perception, technology-assisted instruction

INTRODUCTION

All Technological advancements and the accompanying sociological changes have resulted in developments and innovations in the field of education, as they have in all areas of life, allowing the emergence of alternative educational activities and becoming an important component in the planning and implementation of teaching activities. These advancements have resulted in a substantial shift in the planning and implementation of educational activities over time. Parallel to the speed of technological progress, today's teaching style has shifted away from conventional understanding and toward "technology-assisted teaching," with the influence of modern technologies that are more integrated into instructional activities. Our current understanding of education, new orientations and approaches in teaching have given a new meaning to the teaching profession, as well as new responsibilities to teachers (Karakoç-Öztürk, 2021; Teacher Training and Development General Directorate, 2017).

In response to changing requirements and expectations, it has become necessary to make changes to the general competencies of the teaching profession as well as teacher training programs, and the general competencies of the teaching profession and teacher training programs in Turkey have been rearranged to include the current

developments in technology-assisted teaching (Teacher Training and Development General Directorate, 2017; Council of Higher Education-CoHE, 2018). In order to fulfill the requirements of today's education understanding, the reforming studies carried out regarding the general qualifications of the teaching profession have been updated with large-scale participation as a result of the comprehensive and long-term studies of all interested parties by examining the teaching profession certificates of international organizations (such as the Council of Europe, the World Bank, UNESCO and UNICEF) and various countries (such as USA, Australia, Finland, France, UK, Canada and Singapore) (Teacher Training and Development General Directorate, 2017). As a consequence of program updates implemented in 1997, 2006, 2009, and 2018, teacher training programs were also reformed to meet the demands of the time (CoHE, 2018).

The first steps were taken before the final program regulation for special education departments in 2018, after the regulation on "Teaching Areas, Assignment and Lecture Principles" made by the Ministry of National Education, Board of Education and Discipline in 2014. In 2016, the first restructuring of undergraduate teacher training programs in education faculties across the country took place in special education teaching undergraduate programs. As a result of collaborative studies conducted by the Council of Higher Education and special education departments, special education teaching undergraduate programs were unified and transformed into a single program that trains teachers for special education.

Following this restructuring, admission to the existing and separate undergraduate programs established based on several groups of individuals with special needs (mentally disabled, hearing impaired, visually impaired, and intellectually gifted students) and their education was discontinued. After the 2016-2017 academic year, teacher training started with a single program called "Special Education Teaching Undergraduate Program." The special education teaching undergraduate program was reformed in 2018, following a two-year break, along with other teacher training programs of education faculties. After this final arrangement, the content of the program in 2018 included 27 compulsory common field courses related to special education, 8 compulsory general culture courses, 14 compulsory teaching profession knowledge courses and 4 elective vocational knowledge courses, as well as 12 area elective courses. Teacher candidates choose these 12 area elective courses from 6 different elective course areas (Intellectual Disability, Autism Spectrum Disorder, Learning Disability, Special Talent, Hearing Impairment and Visual Impairment) in line with the criteria in the undergraduate program, and a pool of courses based on these areas. In the undergraduate curriculum, two criteria for selecting area electives have been established. The first criterion regarding this subject is for each teacher candidate to take at least one elective course from each of the six different elective course pools. The second criterion for the selection of elective courses in the undergraduate program is for each teacher candidate to take at least seven area elective courses from a special education area in which they desire to focus based on their personal interests (Special Education Teaching Undergraduate Program, 2018).

The newly organized undergraduate program aims not only to provide teacher candidates with sufficient professional knowledge and skills related to their field, but also to train them to have a developed personality equipped with social, cultural, moral, and intellectual skills and to become moral and cultural leaders who will actively participate in building a more humane and virtuous country and world. For this reason, teacher candidates to graduate from the programs are expected to be (a) familiar with universal, national and local/regional cultures

and the commonalities and differences between them; (b) a role model in terms of cultural, ethical, moral values and personality, and (c) to graduate with technological literacy and as researcher teachers (Teacher Training and Development General Directorate, 2017; CoHE, 2018). With the regulations implemented in undergraduate teacher training programs in 2018, it was aimed to train teachers who meet these expectations through area, general culture, teaching profession knowledge, elective profession knowledge, and area elective courses based on theory and application. In order for teacher-training undergraduate programs to graduate technology-literate teachers, the existing technological skills and perspectives of the teacher candidates should be integrated with pedagogical practices in order to improve their efficacy in technology-assisted teaching (Ajayi, 2011; Puckett, Judge & Brozo, 2009).

Prior to 2016, there was no compulsory field course focusing directly on technology-assisted teaching in special education among the compulsory field courses of undergraduate programs that trained teachers for different disability groups in special education. However, even before 2016 technology-assisted teaching and assistive technologies in special education, current developments based on theory and practice were discussed with the personal foresight and efforts of faculty members under sub-topics of some courses in different teacher training programs (education of the mentally disabled, the hearing impaired, the visually impaired, and the intellectually gifted programs), and candidates were graduating with this awareness, albeit at a basic level. When the elective courses in special education departments the different universities are reviewed, it is seen that in only one an elective course opened under the name of "Use of Assistive Technologies in Education for the Mentally Disabled" was included the first time as a separate course. This course was open " Trakya University Special Education Department, Mentally Disabled Education Department 6th term of the undergraduate program in the spring semester the 2010-2011 academic year. In the first restructuring process in 2016, as a result of the joint efforts of the Council of Higher Education and all special education departments across the country, the first compulsory common a course on technology-assisted instruction in special education was introduced under the name of "Technology-assisted Instruction in Special Education" in the spring semester of the 6th term of the undergraduate program. Furthermore, the special education teaching undergraduate program has incorporated 5 distinct elective courses in total, all of which are related to technology-assisted teaching in special education, with the inclusion of 4 different elective courses in various area elective course pools. After the regulation implemented in 2018, all of the compulsory and area elective courses in the special education teaching undergraduate program, which is about technology-assisted teaching in special education, have kept their place in the special education undergraduate program (Special Education Teaching Undergraduate Program, 2018).

It is seen that there has been a significant increase in the number of studies on special education and technology in the national literature within a decade, with the effect of technological developments and the rearrangements made in teacher training programs in order to train teachers who can respond to the different needs created by these developments in education. Studies establishing the perspectives and attitudes of teachers and teacher candidates concerning the use of technology in special education have played a crucial part in this growth (Aslan & Kan, 2017; Aslan, 2018; Bahçeci, 2019; Çalışkan, 2017; Çay, Yıkılmış & Sola-Özgüç, 2020; Kutlu, Schreglmann & Cinisli, 2018; Miliyazim-Mehmet & Şentürk, 2021; Özdamar, 2016; Sakallı-Demirok, Haksız & Nuri, 2019; Sertkaya, 2021; Yıldız & Yıkılmış, 2020).

There are many factors that impact the quality of technology-assisted teaching, including teachers' and teacher candidates' knowledge of assistive technology, their ability to plan and present technology-assisted instruction in special education and to integrate it into the course plans, and their attitudes, competence, and perceptions of assistive technologies (Milinazim- Mehmet & Şentürk, 2021). For this reason, a deeper understanding of the feelings and thoughts of special education teacher candidates towards technology-assisted teaching is considered necessary. Metaphors are one of the many ways people convey their feelings and thoughts. Metaphor is the expression of what is meant to be said using different ways and similes instead of the known and accepted meaning of a word or concept (Anılan, 2017). Metaphors that are effectively employed in educational settings are useful for understanding complicated and difficult ideas, contrasting abstract facts with more tangible or experienced facts, and thus offering comprehension of unfamiliar occurrences (Lakoff & Johnson 2007). Metaphors can be used in many areas of education, including program formulation and planning, educational administration, learning encouragement, and creative thinking growth (Arslan & Bayrakçı, 2006). Metaphorical perception is the process of forming thoughts through a metaphor (Eraslan, 2011). In the first step of the metaphorical perception process, an abstract phenomenon such as a situation, event, or notion that has to be explained or interpreted is combined with the linguistic expression of a tangible occurrence that is utilized to describe the abstract phenomenon. The next step of the process is the analogies established between abstract and tangible phenomena (Dayı, Açıköz & Elçi, 2020; Sezer, 2003). The researcher selects a phenomenon, circumstance, or concept to be studied in depth throughout this phase. The following stage is to communicate the provided abstract phenomenon to the target audience, who will be requested to explain it using a metaphor. The third stage conveys the comparisons observed by the study participants in describing the metaphor chosen (Dayı et al., 2020).

A deeper explanation beyond the typical explanations is required to understand how individuals comprehend their experiences in an area. Metaphors are viewed as systematic instruments that can be utilized to provide additional explanations of a subject and broaden its scope of application (Güneş & Fırat 2016). From this point of view, it is thought that supporting the current attitude research on technology-assisted teaching in special education (Aslan and Kan, 2017; Aslan, 2018; Bahçeci, 2019; Çalışkan, 2017; Çay, Yıkılmış and Sola-Özgüç, 2020; Kutlu, Schreglmann and Cinisli, 2018; Miliyazim-Mehmet and Şentürk, 2021; Özdamar, 2016; Sakallı-Demirok, Haksız and Nuri, 2019; Sertkaya, 2021; Yıldız and Yıkılmış, 2020) with deeper explanations about technology-assisted teaching will contribute to the development of the general competencies of the teaching profession and the skills of teacher candidates in planning and presenting technology-assisted teaching. This study is expected to assist field professionals and researchers in training technology literate special education teachers and planning future research on the subject. This study aims to determine the metaphors created by teacher candidates for technology-assisted teaching in special education. Answers to the following questions have been sought in accordance with this general purpose.

- (1) What are the metaphors of teacher candidates studying at for technology-assisted teaching in special education?
- (2) In terms of their common characteristics, which conceptual categories do the metaphors of the teacher candidates fall under?
- (3) What are the reasoned explanations of the metaphors created by teacher candidates?

The principles of research ethics were considered in this study, and the necessary ethics committee approvals were obtained. The Trakya University Social and Human Sciences Research Ethics Committee granted permission on 07.07.2021 with document E-29563864-050.04.04-84914.

METHOD

This is a descriptive study, which was conducted in survey model.

Study Group

The participants of the study group were chosen using the purposeful sampling method. The primary goal of purposeful sampling is to find people who can provide more information about the topic under investigation (Patton, 2002). The study group consisted of pre-service teachers studying the undergraduate programme of Special Education Department, Faculty of Education of a university in the Marmara Region in the spring semester of the academic year 2020-2021. A total of 145 teacher candidates who attended the 2nd, 3rd and 4th grades of the Special Education Department who have taken or still taken Technology-Assisted Teaching in Special Education course voluntarily accepted to participate in the research. All teacher candidates participating in the research have knowledge and experience in planning and implementing technology-assisted instruction in special education. These experiences were gained during the "Technology-Supported Special Education" (2nd grade) course as well as other theoretical and practical courses as "Individualized Education Programs -IEP" (2nd grade), "School and Institution Experience in Special Education" (2nd grade, a practical course) and "Teaching Practices" (4th grade, a practical course) courses. The answers of seven teacher candidates participating in the study were not evaluated due to spaces left blank or incomplete in the form, or lack of meaning integrity. Table 1 shows the demographic characteristics of the 138 teacher candidates who took part in the study and were evaluated.

Table 1. Demographic information about the teacher candidates

	Number of participants (n)	Percentage
Gender		
Female	55	40
Male	83	60
Grade		
2 nd grade	67	48
3 rd grade	48	34
4 th grade	24	18
Total	138	100

Table 1 shows that 40% of the teacher candidates participating in the research are female while 60% are male. 48% of the teacher candidates who volunteered to participate in the study and continued their education in the Special Education Department were in second grade, 34% in third grade, and 18% in fourth grade.

Data Collection Tools

Teacher candidates' metaphors about the use of technology in special education were created online (using Microsoft Forms) and collected with a two-part questionnaire. The questions in the first part of the questionnaire collected information about the teacher candidates' grades, and in the second part, in order to reveal the metaphors of teacher candidates for technology-assisted teaching in special education, sentences such as "To me, technology-assisted teaching in special education are like; because,". Because this sentence is a pattern for identifying metaphorical perceptions, the participants were given written instructions in the explanation section of the form not to change it and to express their point of view in accordance with it.

Data Collection

Detailed information about the research process for all grade levels was shared through the "Microsoft Teams" at the "Technology Assisted Teaching in Special Education" course and other online courses. In addition, verbal

information was given to the target participant groups during the other undergraduate courses conducted by the researcher. Online meetings were held with the teacher candidates for each grade level on the day and time before announced. The participants were asked to create and write a metaphor in the "like" section, and the logical rationale for this analogy statement in the "because it is" section based on this pattern statement. The participants filled out the form by clicking on the form link shared simultaneously during this meeting. The teacher candidates spent 10-15 minutes to complete filling out the form. The research data were collected in the last week before the end-of-term exams.

Data Analysis

The metaphors collected in writing from the participant teacher candidates online, as well as the reasoned explanations for the metaphors, were analyzed using the content analysis method in the research. The basic goal of content analysis is to first conceptualize the data, then arrange them logically according to these concepts, present the situations that explain these concepts as categories/themes, and interpret them by quoting directly from the statements of the participants regarding the categories/themes (Creswell & Poth, 2016; Yıldırım & Şimşek, 2011). The data collected throughout the data collecting procedure was examined in this regard, taking into consideration the content analysis stages as well as similar research from the literature (Ateş & Karatepe, 2013; Bozkuş-Genç, 2021; Büyükalın Filiz & Türkmeneli, 2019; Dayı, et al., 2020; Ekici, 2016). After the elimination and enumeration stage, in which the suitability of the obtained data for the purpose of the research is evaluated, the data analysis process was carried out by following the stages of coding, category creation, validity-reliability and interpretation of the data. Details on what was done at each stage are provided respectively in the following section.

Elimination and enumeration of data

At this stage, in order to analyze the data, it was determined whether the statements made by the teacher candidates on the online forms were appropriate for the study. It was found that seven of the 146 forms were not completed by the teacher candidates in accordance with the study's objectives. The lack of a metaphor, a description of a metaphor, or both in the participants' response forms, and the explanation provided after the phrase "because" not being a description compatible with the metaphor written by the teacher candidate, exemplifies the situation of non-compliance with the research purpose. Forms of this nature have been excluded from the research. Afterwards, the forms filled out in accordance with the research purpose were numbered from 1 to 138, and the elimination and enumeration of the data stage were completed.

Coding the data

In the coding process, metaphors expressed by teacher candidates were listed on a form created for this purpose. In order for the researcher to be able to deal with data on metaphorical perception's intensity and to understand the category creation stage, the data was coded and listed using traditional methods, such as manual listing. The metaphors in the forms used in the analysis process were coded using a numbering system, beginning with one. The coding process yielded 56 codes. The frequency values of the metaphors were determined by tabulating and listing the codes and metaphor expressions developed by teacher candidates.

Categorization

First, the statements of teacher candidates were listed in order of number and discussed in terms of their common characteristics. The rationale for each metaphor was then examined one by one, and categories were created based on the characteristics and perspectives emphasized by the participating teacher candidates about technology-assisted teaching in special education. The metaphors listed in the coding stage were subjected to a two-stage control process before being assigned to the appropriate categories. As a result of this assessment, six categories were developed that are thought to best represent metaphors.

Ensuring validity and reliability

In order to ensure internal and external validity in the research process, a brief explanation was given to the participants about the purpose of the research, metaphor and metaphor studies, and what is expected from them, verbally at the end of the online undergraduate courses, and in written form via messaging software (WhatsApp). Participants who agreed to take part in the research were asked to fill out the form created online via a shared link with the description text. Furthermore, teacher candidates were told that they should fill out the forms on their own.

In the process of ensuring internal validity, it was considered that the researcher teaching the "Technology-Assisted Teaching in Special Education" course to almost all of the participants, with the inclusion of a very small number of students (a maximum of 12 students who had transferred between institutions) and the researcher being in long-term interaction with the participant teacher candidates during other theoretical and applied courses would contribute to increasing internal validity by supporting credibility. (Bozkuş-Genç, 2021; Lincoln & Guba, 1986). In order to ensure external validity and to support transferability, (a) the data coding and analysis process was made in accordance with the stages in the literature and reported in detail, (b) the participants were determined through purposeful sampling, and (c) direct quotations regarding the metaphors and explanations written by the teacher candidates in the online forms were included in the findings (Başkale, 2016; Creswell & Poth, 2016; Lincoln & Guba, 1986).

To ensure reliability and to see if the conceptual categories of metaphors that emerged in the research accurately reflect teacher candidates' metaphorical perceptions of technology use in special education, the metaphors in these categories were compared and created by two different researchers with doctoral experience in qualitative research at similar stages (Creswell, 2007; Houser, 2015; Streubert & Carpenter, 2011). The metaphors and conceptual categories were created by two experts other than the researcher analyzing the research data separately, and the list of metaphors under these conceptual categories was finalized. The reliability of the data analysis was calculated using the formula "Reliability = consensus/consensus + dissensus" (Miles & Huberman, 1994). The average reliability of the decoders was found to be .92 as a result of the calculations. Furthermore, teacher candidates' perspectives were explained in the findings with direct quotations by using the participant number (such as Teacher Candidate 1). In order to support the analysis process in the evaluation of the data, the word cloud technique was used, which enables the prominent words to be visualized with more emphasis and large font depending on the frequency of repetition of the word/word groups used in the expression of the metaphors (Bozkuş-Genç, 2021; Hunt, Gao & Xue, 2014). The program available at <https://wordart.com/create> was used to create the word cloud.

The interpretation of the data

In the data analysis stage, the coding of the metaphors created by the participant teacher candidates, the categories and the reasoned expressions related to the metaphors were presented and interpreted in the form of figures and tables.

FINDINGS

The opinions, metaphors of the participating teacher candidates about technology-assisted teaching in special education and metaphor categories are presented by using figures and tables. The metaphors created by the teacher candidates were visualized using figures and tables, categorized, and explained using direct quotes from the participants' reasoned explanations. The data obtained for the first sub-purpose is presented at the beginning of the findings. In the next step, considering that presenting the data obtained with the second and third sub-purpose together would be more meaningful for the readers, the data obtained for these sub-purposes are presented together.

Metaphors Created by Teacher Candidates About the Use of Technology in Special Education

The metaphors created by teacher candidates for technology-assisted instruction in special education and the frequency values of these metaphors are presented in Table 2. The word cloud created based on the metaphors created by teacher candidates about technology-assisted teaching in special education and the frequency of repetition is presented in Figure 1.

Table 2. Metaphors created by teacher candidates about the use of technology in special education

Metaphor Number	Metaphor name	f	Metaphor number	Metaphor name	f	Metaphor number	Metaphor name	f
1	Water	15	21	Obligation	3	41	Live in each other's pockets	1
2	Key	7	22	Journey to the future	2	42	A helping hand	1
3	Compass	7	23	Discovery	2	43	Step into new age	1
4	Revolution in education	6	24	Physiological need	2	44	Ambulance	1
5	Moving forward	5	25	Sky	2	45	A limb of the body	1

6	Life jacket	5	26	Khidr	2	46	Puzzle	1
7	Teacher	4	27	Father	2	47	The letter Z	1
8	Hands and feet	4	28	Convenience	2	48	Human skeleton	1
9	Imagination	4	29	Cold water/water bottle I found in the desert	2	49	Using a harvester instead of a scythe in a field	1
10	Assistant/help	4	30	Sirat bridge leading to heaven	1	50	The first amusement park I went to as a child	1
11	Game	4	31	Breath	1	51	The toy I played with when I was little	1
12	Talking	3	32	Golden key	1	52	Lifebuoy	1
13	Super power	3	33	Salt	1	53	Pencil	1
14	Magic	3	34	Magic wand	1	54	Assistant coach	1
15	Wizard	3	35	The last piece of the puzzle	1	55	Car	1
16	Light	3	36	Polar Star	1	56	Bicycle	1
17	Space	3	37	Sibling	1			
18	Cornerstone	3	38	Sun	1			
19	Assistant teacher	3	39	A good friend	1			
20	Fun	3	40	Spoon	1			

As can be seen on Table 2, teacher candidates of the Department of Special Education have created a total of 56 different metaphors related to technology-assisted teaching in special education. Among these metaphors, water has been repeated 15 times and became the most used metaphor by teacher candidates, while key and compass have been repeated seven times. Revolution in education has been used six times. Moving forward and life jackets have been used five times, and imagination, game, teacher, hands and feet, and assistant/help have been used four times. While the metaphors of obligation, talking, superpower, magic, wizard, light, space, cornerstone, assistant teacher and fun have been repeated three times by the teacher candidates, the eight metaphors used by teacher candidates (convenience, cold water/water bottle I found in the desert, journey to the future, discovery, physiological need, sky, Khidr, and father) have been repeated two times. The 27 unrepeated metaphors have been used only once by teacher candidates.



Figure 1. The word cloud consists of metaphors produced by teacher candidates about technology-assisted instruction in special education

Water, key, and compass are the most commonly used metaphors by teacher candidates, as shown in Figure 1. The metaphor most frequently used by teacher candidates is "water," which is the most basic requirement for life to continue.

Metaphors and Reasoned Explanations About the Use of Technology-Assisted Teaching in Special Education

Teacher candidates of the Department of Special Education have created 56 metaphors about the use of technology in special education. These metaphors are grouped according to their common features and grounds for use. As a result of the grouping study, metaphors were collected under six different categories. The graphical representation of the frequency percentages of metaphors belonging to each category is given in Figure 2, while the frequency and percentage of metaphors related to each category are given in Table 3.

Table 3. Metaphors created by teacher candidates, sorted by categories

Category	Metaphors	f	%
Offering New Opportunities and Acting as a Guide	Key (f=7) compass (f=7) polar star (f=1) sun (f=1) golden key (f=1) light (f=3) breath (f=1)	21	15
Intriguing and Waiting to Be Discovered	Journey to the future (f=2) space (f=3) sky (f=2) discovery (f=2)	9	7
Providing Effective Teaching and Professional Development	Obligation (f=3), sirat bridge leading to heaven (f=1), step into new age (f=1) revolution in education (f=6), moving forward (f=5), the first amusement park I went to as a child (f=1), game (f=4), the toy I played with when I was little (f=1), fun (f=3), magic (f=3), wizard (f=3), magic wand (f=1), super power (f=3), Khidr (f=2), imagination (f=4), cornerstone (f=3)	44	32
Guarantees, Supports and Facilitates	Lifejacket (f=5), Lifebuoy (f=1) helping hand (f=1), assistant teacher (f=3), assistant coach (f=1), teacher (f=4), assistant/help (f=4) using a harvester instead of a scythe in a field (f=1), ambulance (f=1), a good		

	friend (f=1), father (f=2), convenient (f=2), bicycle (f=1), spoon (f=1), car (f=1)	29	21
A Part of a Whole	Live in each other's pockets (f=1), human skeleton (f=1), sibling (f=1), a limb of the body (f=1), puzzle (f=1), the last piece of the puzzle (f=1), the letter Z (f=1)	7	5
Basic Needs	Water (f=15), cold water/water bottle I found in the desert (f=2), salt (f=1), talking (f=3), hands and feet (f=4), physiological need (f=2), pencil (f=1)	28	20

Table 3 shows that the metaphors of teacher candidates are mostly about effective teaching and professional development (f=44). Of the metaphors created by teacher candidates, the category of Intriguing and Waiting to Be Discovered (f=9), and A Part of a Whole (f=7) contain fewer metaphors than other categories.

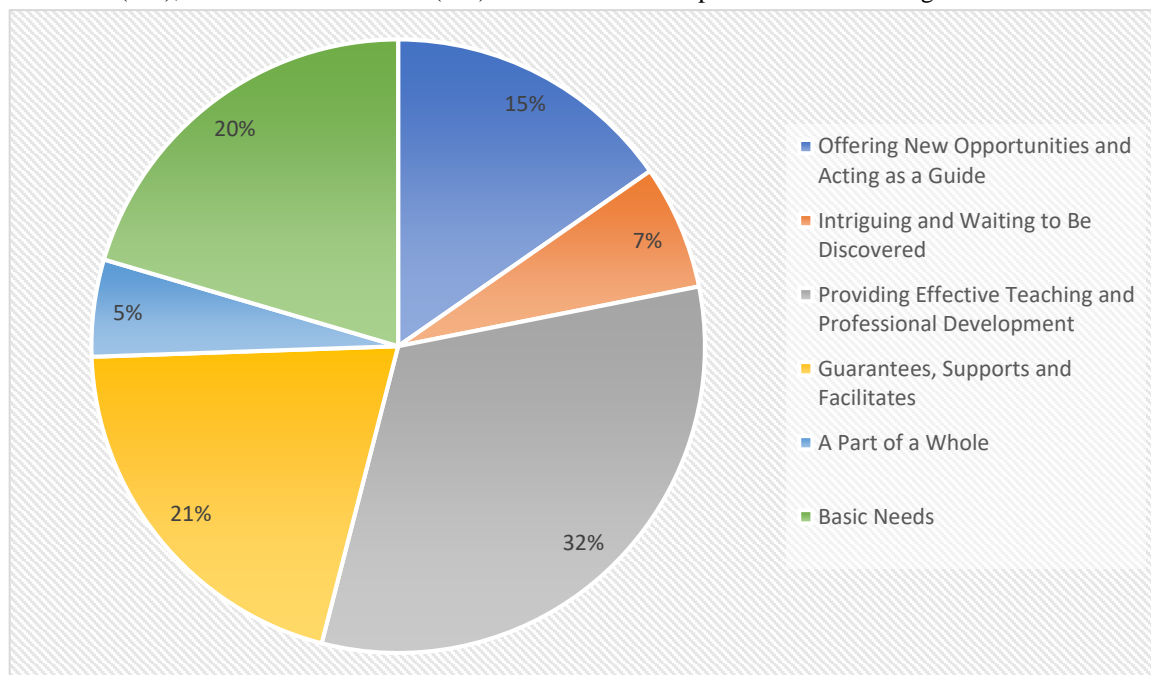


Figure 2. The frequency percentage of metaphor categories produced by teacher candidates

Figure 2 shows that the metaphors created by teacher candidates regarding technology-assisted teaching in special education are grouped under Offering New Opportunities and Acting as a Guide, Intriguing and Waiting to Be Discovered, Providing Effective Teaching and Professional Development, Guaranteeing, Supporting and Facilitating, A Part of a Whole and Basic Needs categories. The following section includes metaphors that fall under these categories and direct quotations from the views of teacher candidates. Table 4 lists metaphors and direct quotation examples under the "offering new opportunities and acting as a guide" category of teacher candidates.

Table 4. Direct quotes of metaphors and explanations of the teacher candidates in the category of "offering new opportunities and acting as a guide"

Metaphor name	Direct quotation examples
Key	<p><i>"It is one of the most important materials for me to enter through the door that opens to the student."</i> Teacher Candidate 63</p> <p><i>"Because it opens many closed doors."</i> Teacher Candidate 44</p>
Compass	<p><i>"Technology-assisted teaching in special education, together with technology, shows us innovative ways just like a compass."</i> Teacher Candidate 83</p>

Polar star	<i>While "teaching" is a small star, "technology-assisted teaching" is a big bright star.</i> Teacher Candidate 41
Sun	<i>"Just as the sun illuminates our world, students with learning disabilities will be illuminated by technology-assisted materials with technology-assisted teaching."</i> Teacher Candidate 24
Golden key	<i>"Teaching has become an even more complex system with the developing technology. Today, there is a bigger need than ever for trained instructors who are familiar with technology, which means that the need for us teachers is growing even more."</i> Teacher Candidate 45
Light	<i>"In the dark, one cannot find their way; light is necessary. Light opens one's path and allows one to conquer difficulties."</i> Teacher Candidate 42
Breath	<i>"Student needs are always being updated in the changing world situations. For me, technology-assisted instruction is a breath of fresh air since it alleviates financial constraints."</i> Teacher Candidate 72

As Table 4 presents, there are seven different metaphors in the category of "offering new opportunities and acting as a guide." The guiding characteristic of technology-assisted teaching in special education is mentioned in the teacher candidates' statements. The two metaphors included under this category and repeated with the same frequency (seven times) are "key" and "compass". Examples of metaphors and direct quotations under the category "Intriguing and Waiting to Be Discovered" are shown in Table 5.

Table 5. Direct quotes of metaphors and explanations of the teacher candidates in the category of "intriguing and waiting to be discovered"

Metaphor name	Direct quotation examples
Journey to the future	<i>"As children learn with technology, their imagination and curiosity will grow."</i> Teacher Candidate 52
Space	<i>"There is a lot of information and help in it."</i> Teacher Candidate 59
Sky	<i>"The fact that the teaching methods used in special education are not in a certain pattern but can also be adapted and used in different ways, has allowed us to discover and create many original materials with our imagination."</i> Teacher Candidate 62
Discovery	<i>"It's like discovering a new world."</i> Teacher Candidate 103 <i>"They should be able to do more research in this world and feel like they belong to the technological world and be able to consider themselves a member of it."</i> Teacher Candidate 54

As can be seen on Table 5, there are four different metaphors in the category of "intriguing and waiting to be discovered." How technology-assisted teaching in special education is intriguing and widens imagination in some ways is included in the teacher candidates' statements. The metaphors included in this category have been repeated by the candidates twice or only once. Examples of metaphors and direct quotations under the category "Provides Effective Teaching and Professional Development" are shown in Table 6.

Table 6. Direct quotes of metaphors and explanations of the teacher candidates in the category of "providing effective teaching and professional development"

Metaphor name	Direct quotation examples
Obligation	<i>"It moves the tools, equipment and teacher factor that help individuals with special needs to overcome their difficulties to a more successful, productive and learner position."</i>

	Teacher Candidate 14
	<i>This is essential for normally developing children as well as for children with special needs.</i>
Sirat bridge leading to heaven	Teacher Candidate 137 <i>"For me, it's the first step toward teaching." I believe it will be extremely beneficial in my teaching career and in the preparation of student materials."</i>
Step into a new age	Teacher Candidate 67 <i>"Technology has found a place for itself in every aspect of our lives in the new era, and we must learn to use it correctly and in ways that will benefit us the most."</i>
Revolution in education	Teacher Candidate 19 <i>"In special education, learning is difficult without technology, and many issues are unresolved."</i>
Moving forward	Teacher Candidate 68 <i>"Special education becomes newer and more contemporary with technology-assisted teaching."</i>
The amusement park I went to for the first time in my childhood	Teacher Candidate 92 <i>"There are many ways of learning. Learning can take place without technology's support, but learning with technology is much more exciting and fun."</i>
Game	Teacher Candidate 80 <i>"It's like a game, I can have fun while learning. I am improving myself and am able to catch the innovations of our time. I had a lot of fun with this lesson, and my perspective on teaching has changed."</i>
The toy I played with when I was little	Teacher Candidate 50 <i>It teaches so many things while being fun</i>
Fun	Teacher Candidate 112 <i>"It can make accessing information that will benefit us more fun."</i>
Magic	Teacher Candidate 46 <i>"Because it miraculously allows the student to grasp the desired subject faster and achieve the seemingly impossible."</i>
Wizard	Teacher Candidate 74 <i>"It allows me to conduct interesting and effective teaching"</i>
Magic wand	Teacher Candidate 127 <i>"It allows me to do effective teaching activities in a short time."</i>
Superpower	Teacher Candidate 90 <i>"It provides unlimited access, which means unlimited teaching."</i>
Khidr	Teacher Candidate 91 <i>"Saving time is an important element both in the variety of materials and in the rapid access to information."</i>
Imagination	Teacher Candidate 29 <i>I can find the opportunity to realize all kinds of materials, projects, teaching methods that I want, imagine and think about without being limited by time and space"</i>
Cornerstone	Teacher Candidate 93 <i>"It enables us to adapt to the basic requirements of students and maximizes learning by making the teaching process effective and efficient."</i>
	Teacher Candidate 18

As Table 6 presents, there are 16 different metaphors in the category of "providing effective teaching and professional development," making it the category with the greatest number of metaphors. Professional development and effective and efficient teaching come into prominence in the teacher candidates' statements. The metaphors of educational revolution (six times) and going forward (five times) are the most frequently repeated metaphors under this category. Examples of metaphors and direct quotations under the category "Guaranteeing, Supporting and Facilitating" are shown in Table 7.

Table 7. Direct quotes of metaphors and explanations of the teacher candidates in the category of "guaranteeing, supporting and facilitating"

Metaphor name	Direct quotation examples
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Life jacket	<i>"It makes my job easier while also increasing the job's impact."</i> Teacher Candidate 4
Lifebuoy	<i>"For being by my side while making teaching adaptations and making my work easier in the planning, processing and conclusion of the lesson and enriching it."</i> Teacher Candidate 13
A helping hand	<i>"Technology saves time and helps to teach in a more practical way."</i> Teacher Candidate 16
Assistant teacher	<i>"It both saves time and enables individuals to better understand the lessons. In addition, it is an indispensable element of teaching and course programs for better use of many technical and teaching methods in education."</i> Teacher Candidate 69
Assistant coach	<i>It is an application that helps me and makes it easy for me to teach behavior to an individual.</i> Teacher Candidate 71
Teacher	<i>"Because it is both a guide and a hard worker."</i> Teacher Candidate 86
Assistant/help	<i>"It relieves the teacher's burdens in teaching because of the conveniences and assistance it provides in the field of education, just as an assistant relieves their boss's burdens by providing him with the convenience of accessing the necessary information and materials."</i> Teacher Candidate 31
Using a harvester instead of a scythe in a field	<i>"It is possible to provide special education without the use of technology, but it would be time-consuming and difficult. Technology makes it easier for students to access information and makes it more permanent, as well as assisting teachers."</i> Teacher Candidate 58
Ambulance	<i>"Technological materials were very motivating for students and their interest in the lessons increased when the lessons were unfruitful during the semester or to draw their attention before the lesson."</i> Teacher Candidate 21
A good friend	<i>"It is always there for me when I am teaching and helps me when I am in a difficult situation."</i> Teacher Candidate 6
Father	<i>"When the father, head of the household, gets sick or his absence is felt, it seems that things in the house are disrupted day by day and nothing is going well. Technology-assisted teaching = efficient teaching, permanent learning, continuity..."</i> Teacher Candidate 11
Convenience	<i>"It saves me from preparing materials like craft papers. It allows me to use my creativity outside of my natural abilities."</i> Teacher Candidate 40
Bicycle	<i>"The bike makes it faster and easier to get from place to place, and we achieve our main goal of relocation. Similarly, technology-assisted teaching makes learning a quick and easy task."</i> Teacher Candidate 65
Spoon	<i>"Because using a spoon while eating makes our job easier and allows us to eat faster and more conveniently."</i> Teacher Candidate 43
Car	<i>"Because it allows us to get to the point we want to get to faster, with less fatigue."</i> Teacher Candidate 9

As Table 7 presents, 15 different metaphors that mention how supporting teaching activities in special education with technology facilitates and helps overcome difficulties are included in the category of "guaranteeing, supporting and facilitating." Examples of metaphors and direct quotations under the category "A Part of a Whole" are shown in Table 8.

Table 8. Direct quotes of metaphors and explanations of the teacher candidates in the category of "a part of a whole"

Metaphor name	Direct quotation examples
Live in each other's pockets (used of means each other inseparable)	<i>Individuals with special needs may have different educational needs depending on their characteristics. In the process of differentiation of teaching, technology-assisted teaching has a great place and is inseparable from each other.</i> Teacher Candidate 15
Human skeleton	<i>"People cannot make any progress without their skeleton, and I think that without special education and technology, teachers and students cannot make any progress"</i> Teacher Candidate 37
Sibling	<i>"At this age, they and lessons are like an inseparable whole."</i> Teacher Candidate 28
A limb of the body	<i>"Theoretical knowledge and conventional practices cannot fully benefit students. Technology-assisted teaching is necessary and important for special education."</i> Teacher Candidate 75
Puzzle	<i>"Technology-assisted teaching is indispensable in terms of the functionality of the courses today, where technology and material options increase and develop."</i> Teacher Candidate 2
The last piece of the puzzle	<i>"By adapting the education, we have received to the present day, we will have completed our education."</i> Teacher Candidate 39
The letter Z	<i>The repetitions made by the student utilizing technology, as well as the learning done in this manner, remind me of the letter Z, because the use of technology in special education aids in the completion of the learning.</i> Teacher Candidate 32

As shown in Table 8, the importance of technology-assisted teaching in special education and its feature of being an important part of teaching processes are mentioned with seven different metaphors in the category of "a part of a whole" from the perspective of special education teachers. Examples of metaphors and direct quotations under the category "Basic Needs" are shown in Table 9.

Table 9. Direct quotes of metaphors and explanations of the teacher candidates in the category of "basic needs"

Metaphor name	Direct quotation examples
Water	<i>"It is vital for course processing." Teacher Candidate 5</i> <i>"Education is like growing flowers. The flower must be placed in a suitable favorable environment and properly watered in order to grow healthy."</i> Teacher Candidate 55
Cold water/water bottle I found in the desert	<i>"We cannot live without water. Technology knowledge and use, which are now as essential as water, have become a basic need."</i> Teacher Candidate 77
Salt	<i>"Just as you can't eat without salt, you can't succeed in education today without technology. Both are necessary for man's survival, but too much of either is harmful."</i> Teacher Candidate 85
Talking	<i>"Technology has found a place for itself in every aspect of our lives in the new era, and we must learn to use it correctly and in ways that will benefit us the most."</i> Teacher Candidate 82
Hands and feet	<i>"Technology is a must in everyone's life in this century, even if they don't have special needs."</i> Teacher Candidate 36
Pencil	<i>"Now that technology is so ingrained in our lives, technology-assisted teaching has become indispensable, mandatory, and functional; to a teacher, it's like a pencil."</i> Teacher Candidate 7
Physiological need	<i>"Just as we need water, air, and food to live, we also need technology to learn effectively, whether at a low, medium, or high level."</i>

Teacher Candidate 25

As shown in Table 9, it has been mentioned that technology-assisted teaching in special education is among the basic needs necessary for life with seven different metaphors in the category of "basic needs." It was emphasized that technology is among the most basic needs and the most frequently repeated metaphor by teacher candidates is "water" with 15 repetitions.

CONCLUSION AND DISCUSSION

This study aims to examine the metaphors developed by teacher candidates about technology-assisted teaching in special education. As a result of the research, the metaphors created by teacher candidates were collected under six different categories and a total of 56 metaphors were included in these categories. The first category created based on the explanations related to the metaphors created by teacher candidates for technology-assisted teaching in special education is the "offers new opportunities and acts as a guide" category. In this category, "key" and "compass" have been the two metaphors most frequently repeated by teacher candidates (they have both been repeated seven times). "Key," one of the most repeated metaphors under this category, is also among the metaphors produced during Ataman-Uslu's (2021) research in which the metaphorical perceptions of teacher candidates from different teacher training undergraduate programs about technology integration were determined. The "intriguing and waiting to be discovered" category is the second category determined in the research process. When the metaphors under this category are examined, it is seen that teacher candidates touch on the fact that technology-assisted teaching enriches the imaginations of trainee teachers and has a fairly large number of interesting and intriguing applications.

The third category included in the study is the category of "providing effective teaching and professional development." Under this category, it is seen that teacher candidates produce the most metaphors (44 metaphors, 16 of which are unique) compared to other categories. Under this category, with the metaphors they produced about effective teaching, teacher candidates mentioned the new perspective brought by technology to today's understanding of education, the changing roles of teachers in this process, and the facilitating and entertaining aspect of technology in the process of planning and application of education, as well as why technology-assisted teaching is important for effective teaching and professional development. The opinions of special education teacher candidates about technology-assisted teaching in special education can be associated with the knowledge and experiences they gained in the Technology-Assisted Teaching and Teaching Practice in Special Education I courses they attended during their undergraduate education. This can also be interpreted as a high level of awareness of technology-assisted teaching in special education among the candidates. In addition, the metaphors of "magic", "wizard" and "magic wand" used seven times in total by teacher candidates under this category, were among the metaphors produced by special education teacher candidates in a study conducted by Aydın, Somuncu-Demir and Aksüt (2021), which included teacher candidates from the special education department and different undergraduate programs. The fourth perception category yielded by the research is the category of "guaranteeing, supporting and facilitating." This category has the second-highest number of metaphors, with 15 different metaphors. This category contains explanations about how technology can help teachers reduce their workload by assisting them in planning and implementing effective, interesting, and permanent learning with less effort and in a shorter amount of time.

The fifth category is the one in which how technology-assisted teaching is a part of a whole is emphasized. In this category, it is seen that teacher candidates perceive technology-assisted teaching in special education as bark and tree, a human skeleton, a limb of the body, a puzzle and the last piece of the puzzle. When the metaphors created by teacher candidates in this category were examined, it was concluded that they consider technology-assisted teaching as one of the important parts of a whole in special education. The findings of Ataman-Uslu's (2021) study, which determined the metaphorical perspectives of teacher candidates on technology integration, are consistent with the findings of this category. The sixth and final category within the scope of the study is the category in which the emphasis is placed on the fact that technology-assisted teaching is a basic need. Teacher candidates in this category drew attention to the similarities between technology-assisted teaching in special education and physiological needs and expressed their belief that technology is as important as a person's physiological needs in today's educational understanding. Similar metaphors were found in studies conducted in the literature to determine teacher candidates' perceptions of technology. Teacher candidates in these studies also connected technology-assisted teaching to basic human needs such as "water and air" (Aydın et.al., 2021).

The 27 metaphors developed by teacher candidates are non-repeating metaphors. This can be explained by the fact that individual experiences are important in the creation of different metaphors by the participants (Cisek, 1999;

Dayı et. al., 2020). These findings show that individual experiences such as perception, attitude, belief and past experience are important factors in the creation of different metaphors (Aubusson, 2002; Cisek, 1999; Dayı et. al., 2020; Ekici, 2016), and the perspectives of the participants on the relevant concept are quite broad (Bozkuş-Genç, 2020). From this point of view, the metaphors used by the special education teacher candidates only once can be explained by the differences in the individual competence, experience and perspectives on technology-assisted teaching. The study discovered that all metaphors created by teacher candidates are positive. There are studies in the related literature that show that teachers' positive or negative perceptions of technology have an impact on how much they use it (Benson, Farnsworth, Bahr, Lewis, & Shara, 2004; Gök & Erdoğan, 2010; Laffey, 2004; Teo, Chail, Hung & Lee, 2008). The issue of teachers' proper and deliberate use of technology-assisted instruction, on the other hand, should not be overlooked. It is also too important to ignore the risks (failure to use teaching time appropriately and efficiently (Burak and Çörekçi, 2021; Yıldız, 2013), misuse and problematic use of technology by teachers and students in classrooms, and increasing the risk of technology addiction (Mengi and Alpdoğan, 2020) that may arise from the improper use of technology in educational environments and in daily life during the theoretical and applied courses that directly or indirectly address technology-assisted teaching that teacher candidates attend during their undergraduate education.

In conclusion, it is clear that technology-assisted teaching in special education has become a requirement of general teaching competencies that have evolved with today's understanding of education. This viewpoint is supported by the arrangements made in today's undergraduate programs that train teachers, as well as the general qualifications of the teaching profession. According to the literature, existing technology-assisted teaching courses in teacher training undergraduate programs are not adequate in some cases, such as not being adapted to teacher candidates' technology proficiency levels and not being strategically compatible with one another (Baek & Sung, 2020). Thus, it is important to determine the perspectives of teacher candidates and to consider the results in teacher training processes in order to realize the competencies of teacher candidates in providing technology-assisted instruction at the targeted level in undergraduate programs. This study was conducted with the teacher candidates at Special Education Department who are continuing their education. It is suggested that future studies be planned in which prospective teachers from various special education departments are brought together as participants and their perceptions of technology-assisted teaching in special education are determined using metaphors. These studies can identify the similarities and differences between special education departments in various faculties of education, as well as set the competencies expected of special education teachers in providing technology-assisted instruction to specific standards in the national context, in accordance with our country's needs and resources. In addition, future studies that use metaphors to determine the perceptions of in-service special education teachers about technology-assisted teaching practices in their classrooms can be used to determine, plan, and implement the content of technology-assisted teaching professional development programs.

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