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METAPHORIC PERCEPTIONS OF SPECIAL EDUCATION PRE-SERVICE TEACHERS REGARDING ASSISTIVE TECHNOLOGY

Abstract: This study aims to determine the metaphoric perceptions of special education pre-service teachers regarding the concept of assistive technology. The phenomenology pattern, one of the qualitative research approaches, was employed in this study. In this study, 81 special education pre-service teachers participated. The study used a questionnaire consisting of two parts. In the first part, the teachers' demographic information and the second part, an open-ended questionnaire in which "Assistive technology is like/similar to...because..." prompt exists. For the analysis of the study data, content analysis was conducted. At the end of the research, it was determined that special education pre-service teachers created 76 different metaphors for the concept of assistive technology. In general, metaphors such as "friend", "organ", "guide," and "light" came to the fore. In addition, the metaphors created by the pre-service teachers were grouped under seven different themes: "providing/being support", "guidance", "integration", "facilitating life", "independence", "acceleration," and "individualization."

Keywords: Metaphor, perception, assistive technology, special education pre-service teachers.

Introduction

Learning environments and digital teaching materials designed around developing and changing technology are essential place in special education. The main reason for this is the difficulties experienced in special education and the fact that technological tools and equipment can offer solutions from different aspects for these difficulties to progress differently in each individual with special needs. Technologies used by individuals with special needs are generally referred to as assistive technology (AT) in the literature. AT is an umbrella term that relates to the products, tools, and services used by individuals with special needs (Abu-Alghayth, 2020; Anna, Sharif, Wong & Marriappan, 2014; Chukwuemeka & Samaila, 2020; Coleman, Cramer, Park & Bell, 2015; Dominic, Chukwuemeka & Babatunde, 2020). AT help individuals with special needs overcome the difficulties they may encounter in social life and provide opportunities to use their existing skills and capacities at the highest level (Mordini et al., 2018; Pettersson & Fahlström, 2010). In addition, it helps individuals with special needs access information quickly, increase their social life skills, and improve their social skills

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(Alnahdi, 2014; Blackhurts, 2005). In other words, the strong bonds established between the education of individuals with special needs and technology can provide equal opportunities for individuals with special needs when presented with appropriate arrangements for educational purposes (Lee & Templeton, 2008).

Appropriate use of AT is seen as one of the tremendous equalizing forces for students with special needs to participate meaningfully in educational activities by providing access to the general education curriculum (Kamali-Arslantaş, 2017; Kamali-Arslantaş, Yıldırım & Altunay Arslantekin, 2021; Michaels, Prezant, Morabito, & Jackson, 2002). Therefore, substantial literature documenting the potential importance of AT in incorporating students with special needs into school programs (Blackhurst & MacArthur, 1986; Inge & Shepherd, 1995). Some studies in the literature (e.g., Bausch & Hasselbring, 2004; Edyburn, 2004; Judge & Simms, 2009; Parette, Peterson-Karlan, & Wojcik, 2005) suggest that AT should be integrated into teacher training programs. In some studies (e.g., Ahmed, 2018; Al-Moghyrah, 2017; Atanga, Jones, Krueger & Lu, 2020; Marino, Sameshima & Beecher, 2009; Onivehu, Ohawuiro & Oyeniran, 2017), it is suggested that the success of students with special needs in the use of AT is directly related to the knowledge, skills, and tendencies of special education teachers. Therefore, it is necessary to ensure that special education pre-service teachers can use AT in their educational activities (Van Laarhoven & Conderman, 2011). However, limited use of AT courses/programs in teacher training programs is seen as the primary obstacle to the integration and use of AT by students with special needs (Edyburn, Fennema-Jansen, Hariharan, & Smith 2005; Judge & Simms, 2009; Wojcik, Peterson-Karlan, Watts, & Parette, 2004). Despite this, it is known that AT is integrated into teacher training programs in a minimal number of universities (Alper & Raharinirina, 2006; Staples & Edmister, 2014).

To use technology in special education in a qualified way, teachers are expected to be equipped with technology literacy and technology integration. The new generation teachers' knowledge of technology in many aspects of teaching now shows its effect in many areas such as teaching, preparing materials, meeting the vital needs of students, and counselling families. In the teacher training standards of the Council for Exceptional Children (CEC), it is stated that teachers should use instructional and assistive technologies in content development and teaching (CEC, 2012, p.3). In this respect, it can say that the use of technology is vital in terms of improving the education process and self-development of teachers, and the use of AT is professional competence.

According to the reports published by NAC [National Autism Center] (2011) and NPDC [National Professional Development Center on Autism Spectrum Disorders] (2013), technology-supported applications in the field of special education are expressed as scientifically based applications. In this direction, to see the use cases of technology-supported applications, which is one of the scientifically based applications in the field of special education, how they are used, what the problems are, and whether they lead to efficient and effective results in the literature, the opinions, attitudes, needs and metaphoric perceptions of special education teachers and/or pre-service teachers regarding the use of AT should be obtained. In the literature, various studies are dealing with attitudes of special education teachers and pre-service teachers towards *assistive technologies and their use* (e.g., Alanazi, 2019; Alhossein & Aldawood, 2017; Aslan, 2018; Murugaiyan & Arulsamy, 2013; Onivehu et al., 2017; Sakalli Demirok, Haksız & Nuri, 2019), *their adaptation* (e.g., Van Laarhoven & Conderman, 2011), *perceptions* (e.g., Chukwuemeka & Samaila, 2020; Flanagan, Bouck & Richardson, 2013; Lamond & Cunningham, 2020; Nordström, Nilsson, Gustafson & Svensson, 2018; Poggrund & Smith, 2012), *opinions* (e.g., Ajuwon, Meeks, Griffin-Shirley & Okungu, 2016; Demirkıran, 2005; Demirok, Gunduz, Yergazina, Maydangalieva & Ryazanova, 2019; Özdamar,

2016; Özgüç Sola & Cavkaytar, 2011; Yıkılmış & Tekinarslan, 2005), *difficulties in using technology* (e.g., Atanga et al., 2020; Wong & Cohen, 2015), and *their competencies* (e.g., Siu & Morash, 2014; Zhou, Parker, Smith & Griffin-Shirley, 2011).

When the metaphor studies in the literature are examined, many studies are encountered. For example, in these studies, it is seen that metaphoric perceptions towards *technology* (e.g., Aydin, Somuncu Demir & Aksüt, 2021; Cavas, Çetin, Palabiyık & Cavas, 2019; Kahyaoğlu, Daban & Çetin, 2017), *the internet* (e.g., Çakır & Filiz, 2020; Hernández González & Reséndiz García, 2020; Jamet & Moulin-Lyon, 2010; Senyuva & Kaya, 2013), *the computer* (e.g., Ekici, 2016; Lombard, 2005), and *the smart phone* (e.g., Gezgin, Hamutoğlu, Gültekin & Yıldırım, 2019; Senel, 2016) have been examined. However, no research has been found in which the concept of AT is handled as a metaphoric perception. In this respect, it may be possible to discuss the need for research. Metaphors provide broader perspectives on existing problems and help research existing situations and problems by revealing schemas in the minds of individuals about concepts (Öztürk, 2007). Whatsmore, metaphors that reveal what is in people's minds (Lakoff & Johnson, 2015) are seen as a way of receiving information, encoding information and expressing themselves (Nelson & Simmons, 2009), and are expressed as a way people use to describe or explain concepts that they have problems in understanding (Martinez, Saudela & Huber, 2001). In recent years, the idea of AT in special education has been considered one of the complex and difficult to understand concepts in education. This study, it is aimed to reveal the perceptions of special education pre-service teachers about AT. It is expected that the findings obtained from the survey will reveal alternative findings to the results presented by different methods in the literature. In addition, within the framework of the conclusions obtained in the research, it is expected to draw a road map for the curriculum of the courses in which AT teaching is carried out, special education pre-service teachers and teachers.

Purpose of the study

This study aims to analyze the metaphors created by special education pre-service teachers regarding the concept of AT. In this context, the researcher requested answers to the following questions:

1. What are the metaphors special education pre-service teachers have about the concept of AT?
2. Under which conceptual themes are the specified metaphors in terms of standard features?

Methods

The phenomenology pattern, one of the qualitative research approaches, was employed in this study. The primary purpose of phenomenology studies is to *take personal experiences related to a phenomenon to a more general level* (Creswell, 2007). Therefore, the phenomenology pattern creates a suitable environment for studies that aim to investigate phenomena that we are familiar with but do not have a detailed understanding of (Patton, 2002). In addition, *phenomenology focuses on the phenomena we are aware of but does not have complex and deep learning* (Yildirim & Simsek, 2016). However, these phenomena may appear in various ways, such as events, experiences, perceptions, concepts, and situations (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2011).

Participants

The study was carried out by special education pre-service teachers studying in the department of special education in a public university in the fall term of the 2021-2022 academic years. The participants were selected based on the purposive sampling method. Accordingly, participation in the study was voluntary, and in total, 81 special education pre-service teachers participated. Thirty-three of them were male (40.7%), and the remaining participants were female (59.3%). The ages of the special education pre-service teachers are between the ages of 23 and 30. While 56 (69.1%) of the participants took the assistive technology course, the remaining 35 (30.9%) did not take this course. The responses of 21 participants were not taken into consideration because either the expressions on the form were left blank, incomplete or meaning integrity was lacking.

Data Collection

The study employed a questionnaire consisting of two parts. The first part collected the participants' demographic information such as age, gender, and taking assistive technology courses. In the second part, an open-ended questionnaire was used to examine special education pre-service teachers' metaphors for assistive technology. For example, the "Assistive technology is like/similar to...because..." prompt exists. This open-ended type of questioning was preferred so that participants could freely reflect their in-depth feelings, ideas, and beliefs in AT. The prompt consisted of two blanks that participants were supposed to complete to articulate their conceptions of AT. Participants were requested to write a single metaphoric expression in the first blank to convey their understanding of AT. The second blank was the explanation part that allowed participants to express their rationale for selecting the term. Since this sentence pattern is used to examine metaphoric perceptions, it was stated to the special education pre-service teachers that they should express their views directly in the most appropriate way without making any changes to the phrase. In addition, before starting the data collection process, pre-service teachers were informed about the study. It was stated to the pre-service teachers that they should not get help from each other, and they were given enough time to complete the task.

Data Analysis

The content analysis was conducted in the analysis of the study data. Content analysis was carried out with the stages of extracting and numbering the data, coding, categorizing, conducting validity and reliability studies, and interpretation. Accordingly, firstly, the questionnaire filled by the special education pre-service teachers was examined. As a result, it was determined that the answers of 19 pre-service teachers were not suitable for the research due to situations such as not writing the metaphor and not expressing the reason. Therefore, these questionnaires were excluded, and the remaining questionnaires were ranked from one to 81. These second-ranked questionnaires were coded one by one by the researchers. As a result of this process, 347 metaphors were obtained under 76 different codes. These codes' frequency and percentage values were calculated and tabulated (Table 1). As a result of this analysis, 347 valid metaphors were grouped concerning their similarities and standard features. In addition, each group was associated with a particular theme, and seven different themes were obtained (Table 2). In addition, each teacher candidate was given a code (e.g., PT₁, PT₂). Excerpts from the views of pre-service teachers were also included through these codes. In addition, a word cloud was created by the researchers according to the frequency of use of the codes obtained (Figure 1).

To ensure the reliability of the data obtained from the study, the codes created by the researchers and the types created by these codes were compared. For this, the study data were coded separately by the researchers. The principles and categories that emerged later were listed. The agreement among the coders was calculated using the formula " $Reliability = \frac{Consensus}{Consensus + Disagreement}$ " (Miles & Huberman, 2015). As a result of the calculation, the mean inter-coder reliability value was found to be .92.

Findings

The word cloud of the metaphors produced by the special education pre-service teachers regarding the concept of AT is shown in Figure 1.



Figure 1. Word cloud of metaphors produced by special education pre-service teachers on the concept of AT

When the data given in Table 1 is considered, it is seen that special education pre-service teachers created 76 different metaphors regarding the concept of AT. It is observed that 6.9% of the special education pre-service teachers considered AT similar to a "friend." It is observed that 5.8% of the pre-service teachers thought AT was identical to "organ." In addition, 4.6% of the pre-service teachers considered AT similar to a "guide" or a "light." Apart from these, the most common metaphors used by the pre-service special education teachers for AT are as follows: "family", "jigsaw", "lifeguard", "drug", "compass", "book", "life coach", "helping", "teacher", "access to information and instrument", "bridge", "magic wand", "car", "stairs", "water", "game", "life quality", "key", "superhero", "weather," and "walking stick", respectively.

Table 1. Metaphors produced by special education pre-service teachers regarding AT

Metaphor Names	f	%	Metaphor Names	f	%	Metaphor Names	f	%
1. Friend	24	6.9	27. Sun	4	1.2	53. Shortcut	2	.6
2. Organ	20	5.8	28. Social interaction	4	1.2	54. Sky	1	.3
3. Guide	16	4.6	29. Plan	4	1.2	55. Director	1	.3
4. Light	16	4.6	30. Scales	3	.9	56. Fingerprint	1	.3
5. Family	13	3.7	31. Navigation	3	.9	57. Be the same as everyone	1	.3
6. Jigsaw	13	3.7	32. Chance	3	.9	58. Springboard	1	.3
7. Lifeguard	13	3.7	33. Robot	3	.9	59. Doctor	1	.3
8. Drug	10	2.9	34. Salt	3	.9	60. Roof	1	.3
9. Compass	10	2.9	35. Organism	3	.9	61. Cross the older man	1	.3

10. Book	10	2.9	36. Freedom	3	.9	62. Personality	1	.3
11. Life coach	10	2.9	37. Society	3	.9	63. Justice	1	.3
12. Helping	9	2.6	38. Fly	3	.9	64. Pan out	1	.3
13. Teacher	8	2.3	39. Miracle	3	.9	65. Dove	1	.3
14. Access to information	8	2.3	40. Magnet	2	.6	66. Crash course	1	.3
15. Instrument	8	2.3	41. Henchman	2	.6	67. Fire	1	.3
16. Bridge	7	2.0	42. Library	2	.6	68. Octopus	1	.3
17. Magic wand	7	2.0	43. Feeling	2	.6	69. Secure environment	1	.3
18. Car	7	2.0	44. Tree	2	.6	70. Search engine	1	.3
19. Stairs	7	2.0	45. Need	2	.6	71. Picture	1	.3
20. Water	6	1.7	46. Colleague	2	.6	72. Window	1	.3
21. Game	6	1.7	47. Clock	2	.6	73. Intern	1	.3
22. Life quality	6	1.7	48. Pencil	2	.6	74. Sleep	1	.3
23. Key	5	1.4	49. Vitamin	2	.6	75. Knife	1	.3
24. Superhero	5	1.4	50. Door	2	.6	76. Secretary	1	.3
25. Weather	5	1.4	51. Ship	2	.6			
26. Walking stick	5	1.4	52. Rainbow	2	.6			

In Table 2, metaphor themes created by special education pre-service teachers regarding AT are given. According to the data given in Table 2, the researcher gathered the metaphors created by special education pre-service teachers for the concept of AT in 7 different themes. These themes are as follows: "Providing/being support", "Guidance", "Integration", "Facilitating life", "Independence", "Acceleration," and "Individualization", respectively.

Table 2. Themes of metaphors created by special education pre-service teachers for the concept of AT

Themes	Related Metaphors	f	%
1. Providing/being support	Friend, Family, Lifeguard, Helping, Teacher, Magic wand, Stairs, Game, Water, Walking stick, Superhero, Salt, Magnet, Henchman, Ship, Vitamin, Feeling, Knife, Cross the older man, Intern, Doctor	120	34.6
2. Guidance	Light, Guide, Book, Compass, Key, Sun, Plan, Navigation, Library, Window	71	20.5
3. Integration	Organ, Jigsaw, Bridge, Life quality, Scales, Chance, Society, Colleague, Rainbow, Pan out, Roof, Be the same as everyone, Justice, Picture, Director, Sleep	66	19.0
4. Facilitating life	Drug, Access to information, Instrument, Social interaction, Robot, Miracle, Need, Fire, Secretary	40	11.5
5. Independence	Life coach, Weather, Fly, Freedom, Door, Sky, Dove, Secure environment, Springboard	27	7.8
6. Acceleration	Car, Shortcut, Pencil, Clock, Crash course, Search engine	15	4.3
7. Individualization	Organism, Tree, Octopus, Personality, Fingerprint	8	2.3

Theme 1: Providing/Being Support

When the data given in Table 2 is considered, it is observed that various metaphors, such as "friend", "family", "lifeguard", "helping", "teacher", "magic wand," and "stairs" were produced by special education pre-service teachers regarding AT under this theme. In addition, this theme stands out as the theme in which special education pre-service teachers created the maximum number of metaphors. Sample metaphor expressions created by special education pre-service teachers related to this theme are given below.

"AT is like a friend because it makes you feel that you are not alone." (PT₄₂)

"AT is like family because it helps the individual through their difficulties." (PT₂₆)

"AT is similar to the lifeguard because it always comes to the aid of individuals

with special needs." (PT₄₆)

"AT is like a teacher because it helps individuals while achieving new gains." (PT₅₂)

"AT is similar to the superhero because it enables individuals with special needs to overcome the difficulties they encounter in daily life. (PT₄₄)

Theme 2: Guidance

Special education pre-service teachers created ten different metaphors for the concept of AT under this theme. This theme consists of metaphors, such as "light", "guide", "book", "compass", "key," and "sun", respectively. Sample metaphor expressions produced by special education pre-service teachers related to this theme are given below.

"AT is like light because it illuminates our lives and guides our education." (PT₇₅)

"AT is like a guide because it is a guide." (PT₂₂)

"AT is similar to the compass because it serves to guide individuals with special needs." (PT₃₁)

"AT is like light because it enables the person to determine his route on the way to go." (PT₃₉)

Theme 3: Integration

Under this theme, special education pre-service teachers created 16 different metaphors regarding AT. This theme consists of metaphors, such as "organ", "jigsaw", "bridge", "life quality", "scales", "chance", "society", "colleague," and "rainbow", respectively. Sample metaphor expressions produced by special education pre-service teachers related to this theme are given below.

"AT is similar to the organ because it complements the deficiencies of individuals with special needs." (PT₂₄)

"AT is similar to the jigsaw because assistive technologies complete the missing parts, like a puzzle piece." (PT₇)

"AT is similar to the bridge because it enables individuals with special needs to integrate into society." (PT₇₁)

Theme 4: Facilitating Life

Under this theme, special education pre-service teachers created nine different metaphors for the concept of AT. This theme consists of metaphors, such as "drug", "access to information", "instrument", "social interaction", "robot", "miracle", "need", "fire," and "secretary", respectively. Sample metaphor expressions created by special education pre-service teachers related to this theme are given below.

"AT is like a drug because assistive technologies make the lives of individuals with special needs easier." (PT₃₅)

"AT is like an instrument because it makes life easier for individuals with special needs." (PT₄₅)

"AT is similar to the robot because assistive technologies make life easier for individuals with special needs, such as a robot." (PT₁₄)

Theme 5: Independence

Under this theme, special education pre-service teachers created nine different metaphors regarding the concept of AT. This theme consists of metaphors, such as "life coach", "weather", "fly", "freedom", "door", "sky", "dove," and "secure environment", respectively. Sample metaphor expressions produced by special education pre-service teachers related to this theme are given below.

"AT is similar to the life coach because it helps increase the independence of individuals with special needs." (PT₆₈)

"AT is like fly because it makes people feel free." (PT₄₂)

"AT is like freedom because it supports individuals to live independently." (PT₆₂)

Theme 6: Acceleration

Under this theme, special education pre-service teachers produced seven different metaphors regarding the concept of AT. This theme consists of metaphors, such as "car", "shortcut", "pencil", "clock," and "crash course", respectively. Sample metaphor expressions created by special education pre-service special education teachers related to this theme are given below

"AT is like a car because it allows us to reach education goals quickly." (PT₅₇)

"AT is like search engine because it provides fast access to information and fast use of information." (PT₆₁)

"AT is like search crash course because assistive technology accelerates education time." (PT₉)

Theme 7: Individualization

Under this theme, special education pre-service teachers stated that they consider AT similar to five different metaphors. This theme consists of metaphors, such as "organism", "tree", "octopus," and "personality", respectively. Sample metaphor expressions created by special education pre-service teachers related to this theme are given below.

"AT is similar to the organism because it diversifies, develops and responds to existing conditions and needs." (PT₁₁)

"AT is similar to the octopus because assistive technologies fall into different categories." (PT₆)

"AT is like a tree because it offers products that are individualized according to the needs and characteristics of the individual." (PT₁₈)

"AT is similar to the fingerprint because not every assistive technology is available for every individual; different technology is chosen based on each individual's needs." (PT₁₉)

Discussion

This study aimed to determine the metaphoric perceptions of special education pre-service teachers towards the concept of AT. As a result of the research, it was seen that special education pre-service teachers produced a total of 76 different metaphors under seven different themes for the concept of AT. Each metaphor created is of great importance. It allows pre-service teachers to reflect their point of view on the concept of AT and allow a better understanding of their mentality. Furthermore, it is known that metaphors differ

depending on individual experiences (Cisek, 1999). Therefore, the high diversity of metaphors reached in this study can be considered an indicator of the richness of special education pre-service teachers' perspectives, creativity, and cognitive structures. In addition, the high number of metaphors produced is another indicator that special education pre-service teachers explain their thoughts about AT with different concepts through metaphors (Aubusson, 2002; Mcdermott, 2003).

In the study, the theme with the most metaphoric perceptions of the special education pre-service teachers towards the concept of AT was determined as the theme of *"providing/being support."* Under this theme, special education pre-service teachers compared the concept of AT to the metaphors of *"friend"*, *"family"*, *"lifeguard"*, *"helping"*, and *"teacher."* Special education pre-service teachers' explanations of AT with these metaphors may be because they see assistive technologies as helpful, guiding, enlightening, and guiding. It is seen in the literature that the concept of AT is mostly defined as tools that provide support to individuals with special needs (Kamalı-Arslantaş, 2017; Kamalı-Arslantaş et al., 2021; Michaels et al., 2002). Therefore, it can say that pre-service teachers know the functions of AT tools. Among these metaphors, the explanation of AT with the metaphor of *"teacher"* is considered a unique finding. This metaphor can be thought of as a result of the fact that pre-service teachers see AT in the role of educator-teacher. In a study examining pre-service teachers' metaphoric perceptions of computers, the concept of computer was associated with the metaphor of *"teacher"* (Ekici, 2016). Another critical finding obtained under this theme is that pre-service teachers perceive AT with the metaphor of *"water."* This finding is an indication that pre-service teachers perceive AT as a vital concept such as *"water"*, and they see AT as equivalent to critical needs. On the other hand, this finding also shows how crucial AT is in the lives of teacher candidates.

The second theme in which the metaphoric perceptions of the special education pre-service teachers towards the idea of AT are most intense is the *"guidance."* Under this theme, pre-service teachers compared the concept of AT to the metaphors of *"light"*, *"guide"*, *"book"*, *"compass"*, *"key"*, and *"sun."* The fact that special education pre-service teachers explain the concept of AT with these metaphors can be interpreted as they attribute an essential role to AT. The perception of the *"sun"* metaphor, which plays a vital role in the continuation of life, may indicate that AT is perceived as an indispensable element in life. On the other hand, the use of metaphors such as *"guide"*, *"key"*, and *"compass"* can be considered as a result of the attributes of these metaphors AT.

Another theme in which special education pre-service teachers perceive AT is *"integration."* Integration, which is one of the prominent concepts in special education, *"is an education model which argues that the best educational environment for students with special needs is normal classrooms and that students with special needs should receive all kinds of support they need in the classroom and without leaving their peers."* (Nichols & Sheffield, 2014; Solis, Vaughn, Swanson & McCulley, 2012). In other words, *"it is a multidimensional concept that supports all students to benefit equally from education, life, culture, social opportunities and activities, regardless of their special needs."* (Şahsuvaroğlu, 2020). As seen in these definitions, integration is based on the principle that individuals with special needs can continue their lives in society under identical conditions with individuals with typical development. Pre-service teachers also perceived the concept of AT with metaphors such as *"society"*, *"scales"*, *"being the same with everyone"*, and *"justice"* under the theme of integrating. On the other hand, it was determined that pre-service teachers perceived the concept of AT with the metaphors of *"bridge"* and *"quality of life."* This metaphor indicates that AT acts as a *"bridge"* between individuals with special needs and social and is perceived as an element that improves the

quality of life. However, it can interpret that pre-service teachers' explanation of the concept of AT with the metaphor of "organ" means that they attribute a severe meaning to the idea of AT.

Other themes created in line with the metaphor expressions produced by the special education pre-service teachers are "making life easier", "making the individual independent", "accelerating the individual," and "individualization." In addition, it was observed that the pre-service teachers mostly perceived the concept of AT with the metaphors of "drug", "life coach", "accessing information", "instrument", "car," and "living being" under these themes. These findings can be explained by how pre-service teachers perceive AT as a living creature that makes individuals independent, heals them, and guides individuals' lives. Moreover, the fact that pre-service teachers perceive AT with the metaphor of "accessing information" indicates that pre-service teachers know the functions of AT tools. As a matter of fact, in some studies in the literature (e.g., Aslan, 2018; Blackhurst, 2005), it is stated that AT tools provide significant support and convenience for individuals with special needs to access information. Also, pre-service teachers perceive the concept of AT with metaphors such as "car" and "instrument" may be due to their seeing AT in the role of access and transportation. Considering that AT is an important tool in accessing information, environments and materials (Yalçın, 2021) and that students with special needs benefit from these technologies both in daily life and in academic life (Alicyn Ferrell, 2006; Sadao & Robinson 2010), it is not surprising that pre-service teachers' explanations of AT with these metaphors are an indication that they perceive it positively.

As a result, it can say that the metaphors produced by the special education pre-service teachers for the concept of AT are generally positive. The concept of AT is considered very important by special education pre-service teachers. It is considered a basic need, an indispensable element to be utilized, which supports, guides, and helps development and change. Although there is no study in the literature that aims to determine the metaphoric perceptions of pre-service teachers about AT, it is seen that similar findings are obtained in studies in which metaphoric perceptions of technology and computers are determined. To illustrate, in a study examining pre-service teachers' perceptions of instructional technologies, it is seen that they perceive the concept of technology with metaphors similar to this study (Göksu & Koçak, 2020). The pre-service teachers participating in the study defined instructional technologies with metaphors such as "brain", "world", "light", "vehicle", "computer", "ladder", "oxygen", "compass", "mirror", "puzzle", "medicine", "human", "guide", "ocean", "game", "chess", "water", "basic needs," and "transport network." In a study examining pre-school pre-service teachers' metaphoric perceptions of technology, metaphors similar to this study (e.g., "ease", "light", "need", "water", "life", "medicine", "friend," and "guide") were obtained (Korkmaz & Ünsal, 2016). Therefore, it can be stated that there are research results that coincide with the results obtained. Accordingly, it can say that it supports the literature.

This study aimed to determine the metaphoric perceptions of special education pre-service teachers towards the concept of AT. Metaphors can be used as powerful research tools in understanding, revealing, and explaining the perceptions of special education pre-service teachers about the idea of AT. For example, the metaphoric perceptions of pre-service teachers on different topics such as accessibility and universal design, which are associated with the concept of AT in the literature, and adopted as popular approaches in special education, can be investigated and their metaphoric perceptions for each concept can be compared. As pre-service teachers' knowledge, skills, and competencies about AT increase, they may be asked to develop metaphors about different concepts or phenomena. Thus, it

can ensure that pre-service teachers understand and internalize the idea of metaphor, use it in their professional lives, and see it as a tool in solving problems.

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