INVESTIGATION OF PRE-SERVICE TEACHERS' PERCEPTIONS ABOUT CONCEPT OF TECHNOLOGY THROUGH METAPHOR ANALYSIS*

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ABSTRACT
The study aims to analyse the perceptions of the students enrolled at Hacettepe University in the Department of Primary Education about technology through the metaphor analysis. This study is considered as a descriptive study. In the study a mixed method including quantitative and qualitative techniques was used. The study was carried out among the 1st, 2nd, 3rd and 4th grade students studying at Hacettepe University at the Department of Primary Education during the 2007-2008 Fall Term. The perceptions of the pre-service teachers at the Department of Primary Education were analysed through the content analysis. The metaphors developed by pre-service teachers were analysed with appropriate statistical methods to find out whether it differentiates with various variables. In this study pre-service teachers developed one hundred five metaphors on technology and these metaphors were categorised into nine different categories. While there is a significant difference in their perceptions of technology in terms of participants' general point average and learning to use technology, there is not a significant difference in terms of gender, grade and the frequency of technology use and background information about technology use.
Keywords*:* Technology, perception, metaphor analysis, pre-service teacher.

1. INTRODUCTION

Most of the changes in human's life throughout the history have focused on technology. Technology is individuals' creating new products that make life easier using current equipments and tools. In other words, technology is a multidimensional concept which aims at solving problems depending on scientific knowledge. As the most evident characteristics of a modern society are science and technology, these two characteristics are also an organic component of modern society culture. Individuals' expectations for living in a more modern environment have brought the rapid developments in technology. In recent years, rapid developments in science and technology have affected individuals' life and their education for this life style (Yanpar, 2005; Alkan, 2005; Tor & Erden, 2004; Saban, 2008).

Technology developing and changing remarkably is an indispensable need of contemporary mankind. People encounter new technological device and equipment almost every day. It is important for them not only to realize the benefits of these devices but also use them for their own needs (Çepni, 2005; Çelik & Kahyaoğlu, 2007). Using technology has made individuals and societies stronger about events and phenomena and facilitates life. By technological changes and the opportunities it brings, societies and individuals have new responsibilities. People who are aware these responsibilities and are able to integrate technology with their life situations are always one step ahead (Gündüz & Odabaşı, 2004; Çelik & Kahyaoğlu, 2007).

1. 1 Technology and Education

The most significant task of education system is to educate qualified individuals that are able to catch up with the information era. One of the ways to bring this aim to life is to integrate education and technology (Ayvacı, Nas, Şenel & Nas, 2007). Education and technology are two basic elements which have roles in making individual life more active (Alkan, 2005). From this perspective, it is required that technology, which is defined by Yalın (2004) as a discipline which can be regarded as a bridge between science and its implementation, should be used effectively due to the benefits of it in education as in many fields (Çoklar, Kılıçer & Odabaşı, 2007).

Educational environments today, which are different from the ones in the past, are in a better situation with the integration of technology into the education to make education better, facilitate learning and comprehension. Technology should be used effectively in the design of learning environments due to new technological improvements, so technology is considered as an indispensable part of education settings in the future (Baki, Kösa & Berigel, 2007). In addition to this, when technology is considered in terms of education, technology

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should have a supplementary role in instruction; however, it should not be the objective of the instruction (Demirel & Yağcı, 2007).

Technology has a significant role to make progress in education, so educators need to associate their study fields with technology (Akkoyunlu, 2002). Teachers and their students are two important stakeholder groups in any endeavor to integrate technology into schools; their beliefs and views must be thoroughly understood before any initiative takes place. Researchers, educators and parents are exploring the best ways to integrate technology in classrooms to enhance teaching and learning (Li, 2007). Lim and Chan (2007) argue that investigations on teachers and pre-service teachers' pedagogical beliefs about teaching and learning play a crucial role how they use technology in courses. Technology alone does nothing to enhance pedagogy; successful integration is all about the ways in which technology tools are used and integrated into teaching. (Georgina & Hosford, 2009). Survey research and the literature reviewed indicated that learners, faculty, technology, and environment should be influential areas in determining instructional technology use. Besides, study results revealed that attitude seemed more influential in technology use (Spots, 1999).

The studies that are carried out show that pre-service teachers graduate from faculties of education with limited information, so they have difficulties in using technology and as a result of this, they also have difficulties in developing materials although they have this course during their pre-service education. In addition to this, some studies show that even if they can access technology easily they do not use it (Çağıltay, Çakıroğlu, Çağıltay & Çakıroğlu, 2001; Çelik & Kahyaoğlu, 2007). Some researchers (Guerrero, Walker, & Dugdale, 2004) summarized teachers' attitudes toward the use of technology in classrooms as "apprehensive," whereas their students' attitudes were "mainly enthusiastic".

It is necessary for pre-service teachers to present their abilities to use technology well and use these technologies effectively in their teaching-learning process. Moreover they must be willing regarding the use technology in their teaching (Luan, Fung, Nawawi & Hong, 2005). Guerrero, Walker, & Dugdale (2004) stated that when technology is used well in middle grade mathematics, it can have positive effects on students' attitudes toward learning, confidence in their abilities to do mathematics, engagement with the subject matter, and mathematical achievement and conceptual understanding. The perspectives and perceptions of pre-service teachers are considerably significant as they enable pre-service teachers to benefit from the opportunities of technology more effectively and more efficiently (Çelik & Kahyaoğlu, 2007). Identifying perceptions of pre-service teachers about technology enables to display their ideas, perspectives towards technology and attitudes they obtained through their experiences. The strongest mental devices to display their perspectives, perceptions and attitudes towads technology are the metaphors that are formed about this concept.

1. 2 Metaphor

Metaphor is considered as the strongest device for an individual to comprehend and explain a hypothetical or an abstract, complex fact in a high level (Saban, Koçbeker & Saban, 2006). A metaphor can be defined as Dickmeyer (1989) suggests, "the characterisation of a phenomenon in familiar terms". In other words, people use metaphors to simplify their experiences. The essence of metaphor, according to Lakoff and Johnson (1980) is the understanding and experiencing of one kind of thing in terms of another (Farrell, 2006). Metaphors as representing our entire conceptual system including "the way we think, what we experience and what we do everyday" (Lakoff & Johnson, 1988). Whether metaphors are approached as a way of "seeing" or as a way of thinking about situation, they reflect how situations and processes are perceived (Inbar, 1996). Metaphor is a meaning transfer that passes from one abstract and complex object having perceptual similarity to another. Metaphors enable individuals to compare experienced facts and abstract and complex facts; as a result, it enables to develop comprehension related to unknown facts (Saban et al., 2006; Semerci, 2007). Three important features of metaphor are regognized in the literature: 1) the pervasiveness of metaphors 2) their ability to capture complex constructs in the field and 3) their usefulness as vehicles for reflection and consciouness raising among educators (Guerrero & Villamil, 2001).

In recent years, a perspective which is particularly based on Lakoff and Johnson's (2005) studies and called as *"mental metaphor theory"* has been the point at issue (Saban, 2009). George Lakoff and Mark Johnson's theory of metaphor (1980, 1999) provides a basis for describing everyday cognitive structures using linguistic models and thus, making it possible to uncover both individual and collective patterns of thought and action (Schmitt, 2005). Metaphors can never convey the full content of their message, nor can they transmit only the content of their intented message. Metaphors rest on the mental process of selection and emphasis. Metaphors are useful especially in understanding and explaining a new concept. Therefore, metaphor makes learning new information easier. In most cases, metaphors were the outcome of creative, theoretical thinking attempting to enrich our insight into educational phenomena (Cerit, 2008; Inbar, 1996).

Metaphors play an important role in educational research and learning theory. Metaphors can be considered to be a cognitive tool in educational settings which makes both teachers and students' tasks easier owing to their memory supportive roles in coding new information and restore later; and they can help paying attention and they can support in forming new explanations (Açıkgöz, 2002). Metaphors are also an important part of teachers' personal practical knowledge that shapes their understanding of their role as teachers. Clandinin (1986) suggests that metaphors are indications of the way teachers think about teaching and also guide the way they act in the classroom (Pajak, 1986; Clandinin, 1986 as cited in Farrell, 2006). In general, researchers agree that metaphors are widespread social habits that are part of teachers' discourse providing access to commonly held beliefs about their profession (Guerrero & Villamil, 2001). Studies indicate that teachers often make use of metaphorical language when they speak about their professional work, their beliefs, and their learning enviroments (Munby, 1987; Tobin, 1990).

1. 3 The Importance and Purpose of the Study

One of the most important elements of education process is the teacher. The expected qualifications of contemporary teachers have varied more with technology (Yanpar, 2005). In today's world, teachers should use technology effectively in education settings and should have positive perceptions about technology to use it effectively. There is a significant relation between teachers' perceptions of technology and their uses of it (Teo, Chail, Hung & Lee, 2008). The studies show that teachers' perceptions about technology affect the level of their technology use (Benson, Farnsworth, Bahr, Lewis & Shara, 2004; Laffey, 2004). In the study carried out by Akpınar (1999) emphasized that negative perceptions about technology delay the application of technology. It can be stated that as some teachers have negative perceptions of technology they do not want to use it or avoid using it, so to make them develop positive perceptions of technology they should be encouraged to use technology before they are in service (Cuban, 1986 as cited in Yanpar, 2005).

The study aims to analyse the perceptions of the students studying at Hacettepe University in the Department of Primary Education about technology through the metaphor analysis. In the study, technology is regarded as a general concept including all technological materials and equipment which pre-service teachers use in daily life and education settings.

2. METHOD

2. 1 Research Design

This study is a descriptive study as it aims to present the available situation as it is. Mixed method including quantitative and qualitative techniques is used in this study. A mixed method research design is a procedure for collecting, analysing, and mixing both quantitative and qualitative research and methods in a single study to understand a research problem. The basic assumption is that the use of both quantitative and qualitative methods, in combination, provides a better understanding of the research problem and questions than either method by itself (Cresswell, 2008). Educational research increasingly should be a mixture of quantitative and qualitative approaches (Fraenkel & Wallen, 2003). In the analysis of qualitative data, the perceptions of the pre-service teachers were analysed through the content analysis. Besides, in the analysis of quantitative data, the metaphors developed by pre-service teachers were analysed with appropriate statistical methods to find out whether it differentiates with various variables.

2. 2 Study Group

The study was carried out among the 1st, 2nd, 3rd and 4th grade students studying at Hacettepe University in the Department of Primary Education during the 2007-2008 Fall Term. This study was performed with 487 students chosen according to convenience sampling method among 560 students enrolled at Elementary Education Program. A convenience sample is a group of individuals who (conveniently) are available for study. The obvious advantage of this type of sampling is that it is convenient (Fraenkel & Wallen, 2003). The distribution of pre-service teachers participated into the study according to their genders and grades were presented Table 1.

Table 1: The Distribution of Pre-service Teachers Participated into the Study According to Their Genders and Grades

Gender	f	%
Female	357	73,3
Male	130	26,7
Grades		
1	90	18,5
2	121	24,8
3	168	34,5
4	108	22,2
Total	487	100

2. 3 Data Collection

Metaphors were used in collecting qualitative data in this study. Metaphor-based data collection process is not different at all from individual or focus group interviews based on open ended questions. Due to the properties of the collected data, it is easier and more practical data collection method than some types of individual interviews, focus group interviews, observation and document investigation because when used alone richer metaphors can be obtained from individuals by means of one or several open ended questions during a typical "metaphor based" qualitative data collection procedure (Yıldırım ve Şimşek, 2006). Metaphor analysis was used as a research tool in this study. In education research, metaphor analysis has long been used as a heuristic to raise awareness about theoretical assumptions, chellenge established beliefs and promote change in classroom (Guerrero & Villamil, 2001).

Interview form was prepared to find out the technology related perceptions of pre-service teachers participating in the study. First part of the form includes personal information related to various variables and the second part includes the completion of the sentence *"Technology is like ..... because ....."*. In metaphor studies "like" concept is used to recall the relationship between metaphor source and metaphor topic clearly (Saban et al., 2006). In the interview forms given to the students in order to make them establish sentences that will support their metaphors logically "because" is used as a conjunction word. The study also includes closed ended questions with an aim to obtain information about the genders, general point averages (GPA), circumstances to access technology, the frequency of technology use, background of technology use and their learning of using technology.

2. 4 Data Analyses

The technology related perceptions of the pre-service teachers were analysed through content analysis method. Content analysis is a technique that enables researchers to study human behavior in an indirect way, through an analysis of their communications. It can be used in any context in which the researcher desires a means of systematizing and quantifying data. It is extremely valuable in analyzing observation and interview data (Fraenkel & Wallen, 2003). The basic aim of the content analysis is to access the relations and concepts which can explain the collected data (Yıldırım & Şimşek, 2006). In the study, firstly, 539 teachers were asked to fill in the interview forms, but the forms of 487 pre- service teachers were included to the study. Remaining 52 forms were not included due to the fact that they did not include a reason related to the metaphors, they included more than one metaphor and they did not include any sources or they were not logical. The process of analysing and discusssing the metaphors developed by pre-service teachers were carried out in these 5 stages; (1) identification of metaphors (2) categorization of metaphors (3) category development (4) providing the validity and reliability (5) transfer the data to SPSS programme for qualitative data analysis.

1. Stage identification of metaphors. In this stage, metaphors written by pre-servise teachers in interview forms were listed. The invalid metaphors were identified.
2. Stage categorizing metaphors. In the study, the metaphors developed by pre-service teachers were analysed through "metaphor analysis" and "content analysis" techniques, so these metaphors were analysed one by one and categorised in terms of their similarities.
3. *Stage category development.* In this stage of the study, categories were developed for the metaphors that were categorised in terms of similarities. 107 metaphors developed by pre-service teachers were categorised into 10 categories. While categorizing the metaphors, the explanations for the reasons why they developed those categories were considered. For instance; for the explanation of "plant" metaphor it is included differently to "needed" and "developing" categories.
4. Stage providing validity and reliability. Validity and reliability are the most commonly used two important criteria of studies in terms of the plausibility of the findings. Reporting the collected data in qualitative study

thoroughly and how the researcher accessed the findings are two significant criteria of validity. In order to provide the validity of this study, the process of data collection and data analysis were explained in details. Moreover, the findings obtained in this study were supported with the written explanations of the students which were presented in quotations as examples.

Besides, in order to provide the inter reliability, obtained data was firstly analysed by two different researchers. In the second stage, researchers came to an agreement comparing the analysis. Also the metaphors which take place in the categories developed in this study were analysed by three different experts to see whether they represent the related category or not. In this scope, the metaphors developed by pre-service teachers and developed categories were given to three experts in their fields as a list. Field experts were asked to write down the metaphors below the related categories. After that, the categorizations made by experts and categorizations made by researchers were compared. The number of agreements and disagreements in these comparisons was identified and the inter reliability of the data of this study was calculated with Miles and Huberman's formula (Reliability = number of agreements / (total number of agreements + disagreements). The result of this calculation, 96%, 90% and 92% (inter reliability) agreement related to this study was procured. According to Miles and Huberman, the accordance of the researchers and experts approximation to 90 % and/or is over 90 % means that reliability was procured at the demanded level (Miles & Huberman, 1994 as cited in Saban et al., 2006).

Furthermore, in qualitative research, researchers should clarify their situation in the research process for the sake of inter reliability (LeCompte & Goetz, 1982). In this scope, in studies the roles and responsibilities of researchers mean organizing the study process, implementing and finalizing; planning the application process, constituting and implementing application settings; making necessary analysis and reporting findings and results. Researchers' own ideas are included in the stage of reporting results.

5. Stage transferring the data to SPSS programme for qualitative data analysis. In the study, after identifying 107 metaphors developed by pre-service teachers and 10 categories, categories were transferred to SPSS with coding. The percentage and frequency of the metaphors and categories that belong to the students were calculated. In the second stage, it was analysed whether the perceptions of the pre-service teachers change according to the gender, class level, GPA, oppurtunities to access a computer, frequency of using a computer, background information about technology and learning technology and it was analysed with Pearson Chi Square statistical technique.

3. FINDINGS AND RESULTS

The pre-service teachers participating the study developed 105 metaphors. These metaphors were categorised into 9 groups in general. Categories related to the metaphors are "needed", "constantly changing", "developing", "harmful", "beneficial", "addictive", "both beneficial and harmful", "rapidly developing" and "facilitating our life". The frequency and percentage of the metaphors developed by pre-service teachers for "needed technology" were presented in Table 2.

Table 2: The Distribution Frequency and Percentage of the Metaphors About "Needed Technology" Category

Metaphor name	f	%
Food	16	3,29
Water	24	4,93
Money	4	0,82
Plant	1	0,21
Air	4	0,82
Sleep	1	0,21
Life	6	1,23
Sense organ	3	0,62
Family	2	0,41
Mirror	1	0,21
Pencil	2	0,41
Car	1	0,21
Glasses	1	0,21
Human brain	1	0,21
Total	67	13,76

Analysing Table 2, it is seen that pre-service teachers developed 67 metaphors related to "needed technology" category. In this category, pre-service teachers likened technology mostly to water. An example of the metaphor developed related to this category and the reason of developing this metaphor follows as this:

Technology is like the water we drink because it is a concept which we need in all seconds of our lives. Water is necessary for going on our lives and technology is necessary for the continuation of our lives.

The frequency and percentage of metaphors developed by pre-service teachers related to the "constantly changing technology" category were presented in Table 3.

Table 3: The Distribution Frequency and Percentage of the Metaphors About "Constantly Changing Technology" Category

Metaphor name	f	%
Chameleon	36	7,39
Virus	2	0,41
İguana	2	0,41
Flowing water	2	0,41
Frog	1	0,21
Fashionable	3	0,62
Nature	2	0,41
Caterpıllar	1	0,21
Weather forecast	1	0,21
Total	50	10,27

According to the data presented in Table 3 pre-service teachers developed totally 50 metaphors related to this category. They likened technology mostly to a chameleon. The metaphor related to this category was stated with an example below:

Technology looks like a chamelon as it is constanly changing. It never stays as it is.

The frequency and percentage of metaphors developed by pre-service teachers related to the "developing technology" category were presented in Table 4.

Table 4: The Distribution Frequency and Percentage of the Metaphors About "Developing Technology" Category

Metaphor name	f	%
Tree	11	2,26
Human	23	4,72
Child	8	1,64
Seed	6	1,23
Plant	9	1,85
Machine	5	1,03
Giant	2	0,41
Animal	5	1,03
Teacher	2	0,41
Avalanche	2	0,41
Total	73	14,99

According to the data presented in Table 4 pre-service teachers developed totally 73 metaphors related to this category. Pre-service teachers likened the technology mostly to human. An example of the metaphor developed related to this category follows as this:

Technology is like a human because they both grow up and develop.

The frequency and percentage of metaphors developed by pre-service teachers related to the "harmful technology" category were presented in Table 5.

Table 5: The Distribution Frequency and Percentage of the Metaphors About "Harmful Technology" Category

Metaphor name	f	%
Monster	12	2,46
Rodent animal	2	0,41
Mouse	3	0,62
Snake	9	1,85
Hire murder	1	0,21
Dragon	1	0,21
Dark hole	2	0,41
Rain	1	0,21
Darling	2	0,41
Spider	1	0,21
Gamble	3	0,62
Swampy	3	0,62
Dynamite	2	0,41
Total	42	8,62

Analysing Table 5, it is seen that pre-service teachers developed 42 metaphors related to "harmful technology"category. In this category, pre-service teachers likened technology to a monster. The metaphors related to this category were examplified below.

Technology looks like a monster as a monster eat everything that comes in front of it. Technology is eating and consuming each human in front of it.

The frequency and percentage of metaphors developed by pre-service teachers related to the "beneficial technology" category were presented in Table 6.

Table 6: The Distribution Frequency and Percentage of the Metaphors About "Beneficial Technology" Category

Metaphor name	f	%
Cow	7	1,44
River	2	0,41
Angel	3	0,62
Donkey	6	1,23
Vitamine	4	0,82
Sun beams	11	2,26
Library	2	0,41
Encyclopaedia	3	0,62
Brain	5	1,03
Toy	3	0,62
School	1	0,21
Total	47	9,65

Analysing Table 6, it is seen that pre-service teachers developed 47 metaphors related to "beneficial technology"category. In "beneficial" category, pre-service teachers likened technology to sunlights. The metaphors related to this category were illustrated below:

Technology looks like sunlights as sunlights brighten and warm up the world. Sunlights breathe life into all cretaures. Technology has lots of benefits like sunlights.

The frequency and percentage of metaphors developed by pre-service teachers related to the "addictive technology" category were presented in Table 7.

Table 7: The Distribution Frequency and Percentage of the Metaphors About "Addictive Technology" Category

Metaphor name	f	%
Cigarette	12	2,46
Cola	3	0,62
Anaesthetic	5	1,03
Chewing gum	5	1,03
Cream-cake	2	0,41
Hamburger	3	0,62
Chocolate	5	1,03
Darling	3	0,62
Sunflower seed	2	0,41
Total	40	8,23

Analysing Table 7, it is seen that pre-service teachers developed 40 metaphors related to "addictive technology"category. In "addictive" category, pre-service teachers likened technology mostly to cigarettes. An example of the metaphor developed related to this category follows as this:

Technology looks like a cigarette which is a bad habbit because once you get accustomed to cigarette, it is impossible to spend time without it.

The frequency and percentage of metaphors developed by pre-service teachers related to the "both harmful and beneficial technology" category were presented in Table 8.

Table 8: The Distribution Frequency and Percentage of the Metaphors About "Both Beneficial and Harmful Technology" Category

Metaphor name	f	%
X Rays	4	0,82
Nuclear weapon	2	0,41
Bee	7	1,44
Woman	4	0,82
Bacteria	9	1,85
Plant	6	1,23
Delphin	1	0,21
Worm	6	1,23
Wine	3	0,62
Lovebird	1	0,21
Knife	6	1,23
Dog	6	1,23
Rose	3	0,62
Medicine	8	1,64
Lama	3	0,62
Paper	2	0,41
Fire	2	0,41
Cat	3	0,62
Total	76	15,61

Analysing Table 8, it is seen that pre-service teachers developed 76 metaphors related to "both beneficial and harmful technology" category. In this category, pre-service teachers likened technology mostly to bacterias. An example of the metaphor developed related to this category follows as this:

Technology looks like bacteria as bacteria provides life cycle, enables to form some food, but it causes illnesses with weakening the strength of the human body. Technology enables to obtain a lot of information, but it decreases the interaction between people to the minimum degree.

The frequency and percentage of metaphors developed by pre-service teachers related to the "rapidly developing technology" category were presented in Table 9.

Table 9: The Distribution Frequency and Percentage of the Metaphors About "Rapidly Developing Technology" Category

Metaphor name	f	%
Cheetah	11	2,26
Tiger	10	2,05
Leopard	5	1,03
Rabbit	9	1,85
Car	6	1,23
Greyhound	2	0,41
Mosquito	2	0,41
Seal	1	0,21
Total	46	9,45

Analysing Table 9, it is seen that pre-service teachers developed 46 metaphors related to "rapidly developing"category. In the category of rapidly developing technology category, pre-service teachers used cheetah and tiger metaphors related to technology. An example of the metaphor developed related to this category follows as this:

Technology is like a cheetah because a cheetah is very fast. Technology also improves very fast. Additional features are added to mobiles every day.

The frequency and percentage of metaphors developed by pre-service teachers related to the "facilitating life technology" category were presented in Table 10.

Table 10: The Distribution Frequency and Percentage of the Metaphors about "Facilitating Our Life Technology" Category

Metaphor name	f	%
Bulb	2	0,41
Friend	10	2,05
Sun	2	0,41
Magic box	3	0,62
Robot	7	1,44
Compass	3	0,62
Refrigerator	4	0,82
Language	5	1,03
Dishwasher	2	0,41
Telephone	3	0,62
Umbrella	2	0,41
Key	2	0,41
Carrier	1	0,21
Total	46	9,45

Analysing Table 10, it is seen that pre-service teachers developed 46 metaphors related to "facilitating our life technology"category. In "facilitating our life" category participants likened technology mostly to friends. An example of the metaphor developed related to this category follows as this:

Technology looks like a friend because my friends help me whenever I want. I can get help from technology whenever I want.

The comparison of the categories of the technology related metaphors developed by pre-servise teachers in terms of gender was presented in Table 11.

Table 11: Comparison of the Categories Related to Technology Concept According to Gender

Metaphor name	Female f (%)	Male f (%)	Total f (%)
Needed	56 (15,69)	11 (8,46)	67 (13,8)
Constantly changing	35 (9,80)	15 (11,53)	50 (10,3)
Developing	52 (14,56)	21 (16,15)	73 (15,0)
Harmful	32 (8,96)	10 (7,69)	42 (8,6)
Beneficial	29 (8,12)	18 (13,85)	47 (9,7)
Addictive	32 (8,96)	8 (6,15)	40 (8,21)
Both harmful and beneficial	54 (15,13)	22 (16,92)	76 (15,6)
Rapidly developing	31 (8,68)	15 (11,54)	46 (9,4)
Facilitating life	36 (10,08)	10 (7,69)	46 (9,4)
Total	357	130	487
χ^2 =9,98	sd=8	p=0,27	

Analysing the data presented in Table 11, male and female pre-service teachers' perceptions related to technology concept does not differentiate significantly (χ^2 =9,98; sd=8; p=0,27).

The comparison of the categories of the technology related metaphors developed by pre-service teachers in terms of grades was presented in Table 12.

Table 12: Comparison of the Categories Related to Technology Concept According to Grades

Metapfor name	1st grade f (%)	2nd grade f (%)	3rd grade f (%)	4th grade f (%)	Total f (%)
Needed	9 (10)	18 (14,88)	22 (13,09)	18 (16,67)	67 (13,8)
Constantly changing	8 (8,88)	8 (6,11)	21 (12,5)	13 (12,04)	50 (10,3)
Developing	15 (16,67)	18 (14,88)	29 (17,26)	11 (10,18)	73 (15,0)
Harmful	5 (5,55)	13 (10,74)	17 (10,12)	7 (6,48)	42 (8,62)
Beneficial	7 (7,78)	12 (9,92)	15 (8,93)	13 (12,04)	47 (9,65)
Addictive	10 (11,11)	5 (4,13)	19 (11,31)	6 (5,55)	40 (8,21)
Both harmful and beneficial	18 (20)	22 (18,18)	18 (10,71)	18(16,67)	76 (15,6)
Rapidly developing	6 (6,67)	14(11,57)	16(9,52)	10 (9,26)	46 (9,44)
Facilitating life	12 (13,33)	11 (9,09)	11 (6,55)	12 (11,11)	46 (9,44)
Total	90	121	168	108	487
χ^2 =25,87	sd=24	p=0,36			

Analysing the data presented in Table 12, the perceptions of pre-service teachers in different grades related to technology concept does not differentiate significantly (χ^2 =25,87; sd=24; p=0,36).

The comparison of the categories of the technology related metaphors developed by pre-servise teachers in terms of general point average was presented in Table 13.

Table 13: The Comparison of the Categories Related to Technology Concept According to General Point Average

Metapfor name	1 (0,00–1,99) f (%)	2 (2.00–2,99) f (%)	3 (3.00–4,00) f (%)	Total f (%)
Needed	16 (9,09)	28 (13,53)	23 (22,11)	67 (13,8)
Constantly changing	21 (11,93)	18 (8,69)	11 (10,58)	50 (10,3)
Developing	26 (14,77)	28 (13,53)	19 (18,27)	73 (15,0)
Harmful	16 (9,09)	22 (10,63)	4 (3,85)	42 (8,6)
Beneficial	21 (11,93)	19 (9,18)	7 (6,73)	47 (9,7)
Addictive	17 (9,66)	19 (9,18)	4 (3,85)	40 (8,21)
Both harmful and beneficial	23 (13,07)	36 (17,39)	17 (16,35)	76 (15,6)
Rapidly developing	22 (12,5)	20 (9,66)	4 (3,85)	46 (9,4)
Facilitating life	14 (7,95)	17 (8,21)	15 (14,42)	46 (9,4)
Total	176	207	104	487
χ^2 =28,74	sd=16	p=0,02		

Analysing the data presented in Table 13, the perceptions of pre-service teachers having different general point avareges related to technology concept differentiate significantly (χ^2 =28,74; sd=16; p=0,02). It is possible to summarise these differences with these points. The participants whose GPAs are between 2.00 and 2.99 adopt the roles of technology "needed", "developing", "harmful", "addictive", "both harmful and beneficial" and "facilitating our life" more than the participants whose GPAs are between 0,00 – 1,99 and 3.00 and 4.00. The participants whose GPAs are between 0,00 and 1,99 adopt the roles of technology "constantly changing", "beneficial" and "rapidly developing"more than the participants whose GPAs are between 2.00 and 2.99 and 3.00 and 4.00.

The comparison of the categories of the technology related to metaphors developed by pre-servise teachers in terms of the frequency of using technology was presented in Table 14.

Table 14: The Comparison of the Categories Related to Technology Concept According to the Frequency of Using Technology

Metapfor name	1 (everyday) f (%)	2 (a few hours in a week) f (%)	3 (a few days in a week) f (%)	4 (never) f (%)	Total f (%)
Needed	14 (14,28)	24 (16,90)	18 (12,95)	11 (10,18)	67 (13,8)
Constantly changing	10 (10,20)	15 (10,56)	16 (11,51)	9 (8,33)	50 (10,3)
Developing	11 (11,22)	27 (19,01)	18 (12,95)	17 (15,74)	73 (15,0)
Harmful	8 (8,16)	9 (6,34)	14 (10,07)	11 (10,18)	42 (8,6)
Beneficial	10 (10,20)	9 (6,34)	17 (12,23)	11 (10,18)	47 (9,7)
Addictive	12 (12,24)	12 (8,45)	6 (4,32)	8 (7,41)	40 (8,21)
Both harmful and beneficial	18 (18,37)	19 (13,38)	21 (15,11)	18 (16,67)	76 (15,6)
Rapidly developing	8 (8,16)	14 (9,86)	12 (8,63)	12 (11,11)	46 (9,4)
Facilitating life	7 (7,14)	13 (9,15)	15 (10,79)	11 (10,18)	46 (9,4)
Total	98	142	139	108	487
χ^2 =15,36	sd=24	p=0,91			

Analysing the data presented in Table 14, the perceptions of pre-service teachers whose frequency of using technology are different about the technology concept do not differentiate (χ^2 =15,36; sd=24; p=0,91).

The comparison of categories developed by pre-service teachers about technology concept according to backgrounds was given in Table 15.

Table 15: The Comparison of the Categories Related to Technology Concept According to Pre-Service Teachers' Backgrounds

Metaphor name	1 (very limited) f (%)	2 (slightly) f (%)	3 (very good) f (%)	Total f (%)
Needed	10 (11,63)	31 (13,02)	26 (15,48)	67 (13,8)
Constantly changing	8 (9,30)	25 (10,50)	17 (10,12)	50 (10,3)
Developing	14 (16,28)	34 (14,28)	25 (14,88)	73 (15,0)
Harmful	12 (13,95)	18 (7,56)	12 (7,14)	42 (8,6)
Beneficial	6 (6,98)	22 (9,24)	19 (11,31)	47 (9,7)
Addictive	5 (5,81)	20 (8,40)	15 (9,20)	40 (8,21)
Both harmful and beneficial	13 (15,12)	39 (16,39)	24 (14,28)	76 (15,6)
Rapidly developing	8 (9,30)	25 (10,50)	13 (7,74)	46 (9,4)
Facilitating life	10 (11,63)	24 (10,08)	12 (7,14)	46 (9,4)
Total	86	238	163	487
χ^2 =8,97	sd=16	p=0,91		

According to the data in Table 15, pre-service teachers' perceptions who had different backgrounds about technology did not show any differences (χ^2 =8,97; sd=16; p=0,91).

The comparison of the categories of the technology related metaphors developed by pre-servise teachers in terms of the learning of technology was presented in Table 16.

Table 16: The Comparison of the Categories Related to Technology Concept According to Preservice Teachers' Learning to Use Technology

Metaphor name	1 (in class or for making presentation) f (%)	2 (from books/ magazines) f (%)	3 (by the help of friends) f (%)	4 (by myself) f (%)	Total f (%)
Needed	29 (18,71)	15 (26,31)	5 (7,46)	18 (8,65)	67 (13,8)
Constantly changing	11 (7,10)	2 (3,51)	8 (11,94)	29 (13,94)	50 (10,3)
Developing	18 (11,61)	8 (14,03)	16 (23,88)	31(14,90)	73 (15,0)
Harmful	16 (10,32)	2 (3,51)	5 (7,46)	19 (9,13)	42 (8,6)
Beneficial	10 (6,45)	5 (8,77)	9 (13,43)	23(11,06)	47 (9,7)
Addictive	8 (5,16)	7 (12,28)	4 (5,97)	21 (10,10)	40 (8,21)
Both harmful and beneficial	29 (18,71)	8 (14,03)	7 (10,45)	32(15,38)	76 (15,6)
Rapidly developing	15 (9,68)	7 (12,28)	5 (7,46)	19 (9,13)	46 (9,4)
Facilitating life	19 (12,26)	3 (5,26)	8 (11,94)	16 (7,69)	46 (9,4)
Total	155	57	67	208	487
χ^2 =43,09	sd=24		p=0,01		

Analysing the data presented in Table 16, pre-service teachers' perceptions related to technology differentiates according to the pre-service teachers' learning to use technology (χ^2 =43,09; sd=24; p=0,01). These differences can be summarised with these points. Ones who learn to use technology first in classes or ones who learn to use it for presentations adopt the roles of technology "needed" and "'facilitating our life" more than one who learn it from books/magazines, by the help of friends and by myself. One who learn to use technology by themselves adopt the roles of technology "constantly changing", "developing", "harmful", "beneficial", "addictive", "both beneficial and harmful" and "rapidly developing" more than ones who learn to use technology from books/magazines, who learn to use it in class or for making presentation and by the help of friends.

4. CONCLUSIONS AND RECOMMENDATIONS

In this study, it is aimed at investigating pre-service teachers' perceptions related to technology by means of metaphor analysis. In the study, the pre-service teachers' perceptions related to technology is consisted of nine categories as "needed", "constantly changing", "developing", "harmful", "beneficial", "addictive", "both beneficial and harmful", "rapidly improving" and "facilitating our life". Pre-service teachers perceive technology mostly as "both beneficial and harmful" and "addictive" at the very least. This finding of the study indicates that the perceptions of pre-service teachers about the technology vary and the perceptions about the technology are generally positive. This findings obtained in the study are in parallel with the findings indicating that students attitudes and perceptions towards technology are positive and carried out by Boon, Fore and Rasheed (2007). Similarly, the data collected through the interviews enabled the determination of the positive ideas of students on the utilization of technology (Yavuz & Coşkun, 2008). In an experimental study carried out by Lin (2008), opinions of pre-service teachers related to technology based instruction were collected and it was found that the perceptions of pre-service teachers towards the use of technology in Maths classes were positive in general. In the experimental study carried out by Gunter, Gunter & Wiens (1998), it was seen that pre-service teachers who took instructional technology course had positive attitudes towards technology and less anxiety; and the attitudes of pre-service teachers towards technology at the end of the interviews were positive.

The findings obtained in the study carried out by Li (2007) indicated that teachers and students had different perspectives towards the use of technology at schools. This difference reflects their beliefs related to the advantages and disadvantages of technology. Students usually have more positive attitudes towards technology when compared to their teachers. For example, this study indicated that although most of the students found technology in educational settings useful and effective, most of the teachers considered technology as extra work load for both teachers and students; and its educational value was low in terms of the spent time and effort. On the other hand, it was found that students adopt technology willingly and they wanted technology to be used better and more frequently at schools. These findings are supported with the finding that teachers' attitudes towards technology were negative and students' were positive which was obtained by Guerrero, Walker, & Dugdale (2004).

Zoller & Ben-Chaim (1996) found that teachers and students had positive attitudes and beliefs towards working with computers in science teaching. Moreover, in the study carried out by Whetstone & Carr-Chellman (2001), it was seen that although pre-service teachers considered computers as important tools, teachers' positive attitudes towards computers were not enough to use computers successfully and effectively in their classes. In the study carried out by Li (2007), it was stated that 87,3 % of students enjoyed using technology and believed that technology is an effective tool in learning and teaching process. In the study conducted by Spotts (1999) technology users were divided into three levels as low, medium and high. According to Spotts, perception of technology in terms of its being useful and valuable differs among the users: Users at high level perceived that using instructional technologies had more benefits than low level users perceived. Studies conducted in previous years indicated that most teachers were afraid of the facts that the use of technology made understanding mathematical concepts harder for students, students became addicted to technology and technology was not effective as a teaching tool. Moreover, in this study results indicated that teachers expressed concern regarding negative effects of extensive technology usage on mathematical learning (Schmidt & Callahan, 1992). Other research studies indicated that the perceptions of teachers towards technology differ from each other. In these studies, it was found that teachers and their students inferred different meanings from the word technology at schools and in daily life; and some students perceived technology as positive and some perceived negative so that teachers and their students' views of technology will play a crucial role in determining the outcomes of courses (Rennie, 1987; Harding & Rennie, 1992; Rennie & Jarwis, 1995a; Rennie & Jarwis, 1995b). In addition, in the study performed by İşman, Çağlar, Dabaj, Altınay, Altınay (2004) students' perceptions towards computers concluded that students give importance to the computers as a part of their life. In addition to this, research results represent that high percentages concentrated on that there are positive attitudes towards computers because of being tool to organize life efficiently.

When the categories formed as the perceptions of pre-service teachers related to technology are considered as a whole, the most developed metaphors are water, chameleon and human. This finding of the study indicate that the most common metaphors that pre-service teachers developed are related to the categories "needed", "constantly changing" and "developing". When the categories formed as the perceptions of pre-service teachers related to technology are considered apart from each other, the most common metaphors for each category are water, chameleon, human, monster, sun lights, cigarette, bacteria, cheetah, friends and hospital.

Furthermore, pre-service teachers' perceptions related to technology were investigated in terms of the variables like the participants' gender, grades, GPA, frequency of technology use, the background information about technology use and learning to use technology. Pre-service teachers' perceptions related to technology differentiate significantly according to the participants' GPA and learning to use technology. Pre-service teachers' perceptions related to technology do not differentiate significantly according to the participants' gender, grade, the frequency of technology use and the background information about technology use. Similar results were also obtained by other researchers (Tsai, Lin & Tsai, 2001). This finding obtained in the study is in parallel with the Parker, Bianchi, Cheah's (2008) study results indicating that individual factors such as gender, grade point average, class/faculty rank, and length of tenure influence orientation toward technology from some aspects. Moreover, although studies indicate that there is a significant difference between the students' attitudes towards computers, anxieties and gender (Chen, 1986; Collis, 1985; Collis, 1987; Okebukola, 1993), another study on this issue indicates that there is no significant difference between the opinions of instructors on the importance of technology and their genders (Spotts, Bowman & Mertz, 1997)

In the light of the results of this study these recommendations can be given for teacher education and later studies:

1. Education settings should be developed for pre-service teachers to enable them develop positive perceptions towards technology. Thus, it is achieved that pre-service teachers use technology more actively in learning and teaching process.
2. Instructors should use technology effectively in classes and they should be a model for pre-service teachers to enable them develop positive perceptions towards technology.
3. Similar studies can be carried out with teachers to identify their perceptions related to technology.
4. Similar studies can be carried out with teachers in different fields and considering different variables.

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