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A Qualitative Picture of the Concept of Computer in Turkish Children's Minds[1]

Erkan Erdemir* – Ergin Erginer**

* Bilgisayar Öğretmeni, Endüstri Meslek Lisesi, Tokat, Türkiye
E-mail: erdemirerkan@hotmail.com

** Yrd. Doç. Dr., Nevşehir Hacı Bektaş Veli Üniversitesi Eğitim Fakültesi, Nevşehir, Türkiye
E-mail: erginerginer@nevsehir.edu.tr

Abstract

The purpose of this study is to conduct a qualitative research on what meanings the fifth grade students, chosen from three schools with different socio-economic level, assign to the concept of computer.Interviewing and brainstorming techniques were employed in an attempt to describe and interpret the problem in detail and to reveal what students think and how they comprehend. The data obtained from interviewing were transformed into evaluation profiles with the use of concept mapping. Furthermore, the study made an analysis into metaphoric structures. In conclusion, it was discovered that students are aware of computer-related concepts- save a few of them; that they are familiar with foreign words they encounter while playing games; that they know about many types of games; and that they have an idea about the drawbacks of addiction to computers and radiation.

Keywords*: Computer, children, concept mapping, qualitative research*

[1]Reproduced on the basis of a part of Erkan Erdemir's post graduate thesis supervised by Assist. Prof. Ergin Erginer.

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Türk Çocuklarının Zihinlerindeki Bilgisayar Kavramının Nitel Bir Resmi

Öz

Bu çalışmanın amacı, farklı sosyo-ekonomik özelliklere sahip öğrencilerin eğitim gördüğü üç farklı okul özelinde beşinci sınıf öğrencilerinin bilgisayar olgusu üzerindeki düşüncelerini nitel bir çalışma aracılığıyla ortaya koymaktır. Öğrencilerin problematize edilen konuya ilişkin görüşlerini almak ve bu görüşlere nasıl ulaştıklarını keşfedebilmek amacıyla, bire bir mülakat ve beyin fırtınası teknikleri uygulamaya konulmuş ve bu yolla derinlemesine bir araştırma yürütülmüştür. Dahası, çalışma metaforik yapılara ilişkin bir analiz içermektedir. Çalışmanın sonunda, öğrencilerin bilgisayarla ilgili kavramlara yönelik farkındalık geliştirdiği –birkaçını hafızalarına kaydettiklerini-, birçok türden bilgisayar oyununu bildikleri ve aynı zamanda bilgisayar bağımlılığının ve radyasyonun dezavantajlarına dair fikir sahibi oldukları bulgulanmıştır.

Anahtar Kelimeler: *Bilgisayar, çocuk, kavram haritası, nitel araştırma*

Introduction

Adults have always been interested in how children conceive the world around them. The problem is still a living one despite the significant progress made by the theorists of child development since Piaget (Senemoglu 2009). Postman (1995) argued that technological advances destroy the period of childhood and children are transformed into little adults. On the other hand, other studies conducted on the basis of the assumption that the media is not the only reason for this destruction demanded that in order to protect and improve childhood necessary precautions should be taken not only in the media system but also in political, economic, legal systems, etc. Furthermore, such studies proposed that economic conditions should be improved for a decent childhood culture; that children rights should be guaranteed by laws; that educational facilities should be advanced; and that the quality of the education should be increased (Alver, 2004, 141). It is a research subject how the accepted adverse effects of the fast-growing and changing technology on the development of children who turn into little adults (EARGED, 2008) are conceived through their own eyes.

There have been rapid transformations in learning environments in the past two decades prompted by emergent digital technologies. Increasingly, these developments have prompted people to participate in media and the learning possibilities they entail, rather than simply consuming them. Feedback regarding their participation has become far more immediate. Learning tools and content can be shared nationally and internationally. Learning environments and techniques can be customized. There is almost instantaneous and easy access to vast amounts of new information. And new media such as massively multiplayer online gaming environments and virtually enabled social networks pose not only new challenges to learning—new worlds require that we learn about them—but also new possibilities for learning media themselves (Davidson, Goldberg & Jones, 2010, 86).

Computer environments can offer children opportunities to develop their intellectual abilities by making personal discoveries through a continuous process of building on what they already know. Children can gain

concrete experience with dynamic processes acting separately or together, one at a time or in parallel (Cynthia, 1988, 14). Children have always loved running around, whether chasing one anotherthrough a shopping mall, darting along a beach, or playing hide and seek in thewoods. Nowadays, with a selection of mobile technologies stuffed in their pocketsor around their necks, they can do more than simply enjoy the moment. With a digital camera or an iPod at the ready, they can take pictures or record soundsthey encounter during their outdoor pursuits. They can tag these artistic creationswith comments and other personal details and then upload them to Facebook or another social Website to share them with their friends, teachers, or family (Rogers & Price (2009). According to Unsworth, Thomas & Simpson (2005, 6), children growing up in the early years of the twenty-first century have been born into a culture that differs immeasurably from past cultures. These children are the 'net-generation' who take the personal computer and the internet for granted. Communication in this digital culture is marked by the interactivity, immediacy, and complexity of both images and text (Unsworth, Thomas & Simpson, 2005, 6).

It is rather difficult for adults to know or understand the structures that occupy children's minds during the process of learning. The present-day discussions over such discourses are often settled with the concept of generation gap; however, this leads to a more puzzling process. The fact that the meanings in children's minds conflict with those in adults' (Erginer, 2006, 46) is, in one way, a description of the problems they encounter while learning. In this sense, the data of the constructivist approach (Fox, 2001; Brooks and Brooks 1999; 1993) focus on the necessity that learners should not receive information but create rules to make sense of it through a cognitive perspective. Therefore, the constructivism is a picture of an exploration into the learning world of children.

According to Sasan (2002), those individuals who are trained on the basis of the constructivist approach construct knowledge through exploration, discovery, creation, interpretation and establishment of an interaction with environment, and thus learn both the content and process at the same time. The store of knowledge constructed by a child in his/her mind is actually his/her attempt to make the world more comprehensible to him/her. In this sense, the constructivist perspective means discovering

the meanings assigned by children to learning and looking into the picture in their minds. This idea seems to be supported by the recent approaches in learning theories. Even so, the approaches to the curriculum for the technological education of children are rather different (Catholic Schools Office, 2007; MEB, 2006; NYSED, 2005; Ontario Ministry of Education, 1999; Plano Independent School District, 1998; British Columbia Ministry of Education, 1996). The variety is also reflected on how and to what degree teachers are informed about possible conceptual structures in children's minds. The reason for this is that owing to the methods used throughout the process of curriculum development not all curricula offer the set of data on the needs of children to teachers in the same way. Generally, the concept of technology in children's minds is neglected and teachers are prescribed. This is also the case in the studies that discuss the need of developing a curriculum for computer education at school and make an attempt to make recommendations (Proulx, 1993).

If the last century did so much to reinvent the art or science of teaching, why does pedagogy need to be re-thought again just now? This is a particularly urgent question in relation to the new digital technologies, because teachers who are excited about these technologies are often accused of using them regardless of whether or not they are pedagogically effective, and even in ignorance of the long tradition of pedagogical evidence and thought. 'Pedagogy before technology' is a common catchphrase of reflective practitioners in this field, suggesting that – far from trying to create pedagogy anew – we should be in the business of locating the new technologies within proven practices and models of teaching (Beetham & Sharpe, 2013, 3)

An attempt is made to provide students, from the first grade to the fifth grade, with a type of computer education based on the constructivism by the name of information technologies (MEB, 2006). In order to be able to do so, it is important to learn how students conceive the concept of computer, technology and the Internet. Computers have now become a phenomenon surrounding the whole world of children; even so, parents and the state have only placed it in front of children but failed to enable them to benefit from it. Apart from that, we have a useless store of knowledge what the concept of computer means to children or how teachers will

make it more comprehensible to them. Erginer (2008) argues that the curricula developed since 2005 are actually activity-based.

Used primarily for business purposes in its early years, computers have penetrated into children' lives due to its increasingly easier use and improved visual quality. Although children use computers more often for playing games, they also use it, to some extent, for educational purposes (Cekbas, Yakar, Yildirim and Savran, 2003). With computers penetrating into the world of children, certain problems have presented themselves in their lives. Owing to the excessive amount of time they spend on computers, students have suffered from addiction, impaired sight, neurotic disorders, reduced academic achievement and difficulty in communicating with their environment; there have even been cases of death due to enormous amount of time spent on playing computer games (Baslamis, 2005; Kelleci, 2008). It is an undeniable fact that computers have not only advantages but also disadvantages (Tuncer, 2002: 12-13). Parents are under great responsibility for minimizing the adverse impacts of computers on their children (Cengizhan, 2003).

Studies on what and how children think and learn (Papert, 1980; 1980; 2005; Ackermann, 2001) revealed their attitudes towards technology. In a study on how children conceive the world (Casasanto, Fotakopoulou, Boroditsky, 2010), it was discovered that the concepts of space and time are in an asymmetric correlation with each other in children's minds. However, this finding conflicts with Piaget. It was observed that this is also the case for computer screen. In this regard, the fact that recent studies' findings cannot be backed by traditional theories of child development might indicate that the world or the way how children see the world has changed.

In their studies on what primary school students think about the concepts of engineering and technology, Cunningham, Lachapelle and Lindgren-Streicher (2005) showed them the pictures of the lists of the two concepts and asked them whether the pictures were related to technology and engineering. They found that students generally associated the devices that run on electricity with engineering but did have certain misconceptions. As a computer teacher, Sesko (1999) wondered what students think about computers. The author found that they are quite conscious of the

concept of computer and its future. In addition, Lee and Spires (2009) discovered that American children greatly benefit from computers in their lives. It was observed that children have a role in the design of new technologies (Druin, Bederson, Boltman, Miura, Knotts-Callahan and Platt, 1999) and kids are intimately connected with these technologies (Zevenbergen ve Logan, 2008). According to Druin (1999), children are quite honest about their comments on and recommendations for new technologies. Therefore, their opinions are quite important. Generally, there are two reasons for getting help from children in studies. The first one is to test the general content with the aim of providing information for new technologies and the second one is to make an attempt to understand the learning process better in a way that will enable educational practices.

Among interesting findings are that very little kids are heavily connected with technology in America (Prensky, 2001) and that Australian children are backed by their grandfathers in terms of the development of their technological thinking (Jane and Robbins, 2004). Studies on the place of computers in children's learning experiences in Turkey presented findings about the use of teaching methods for a more convenient learning (Gedizgil & Deryakulu, 2008; Gedizgil, 2006), their academic senses of self (Piyanci, 2007), their efforts to make sense of computers (Coklar, Vural and Yuksel, 2010); Vural, Yuksel and Coklar, 2008; Erdogan and Gok, 2008) or their misconceptions about them (Agca, 2006). In addition, it is known that computer technology have more negative effects than positive ones on children's achievement level (Schacter, 1999; Schacter and Fagnano, 1999).

Piyanci (2007) studied the correlation between sixth grade students' academic senses of self in computer lessons and their achievement level. The researcher found that no significant difference exists between the two genders; that the scores regarding their academic senses of self are in direct proportion to their parents' educational status; that students from high-income families have higher scores than others; and that there is a positive correlation between their grades and academic senses of self. In herstudy on the effects of the concept mapping strategy on primary school students' attitudes to and level of motivation for computer lessons, Gedizgil discovered that there is a significant correlation between the concept mapping strategy and students' attitudes to computers and their level of motivation

for computer lessons and that the strategy develops their attitudes and increases their level of motivation. Agca (2006) investigated the effects of the conceptual change approach on sixth grade students' misconceptions about the basic concepts of computer, on overcoming these misconceptions and on their attitudes to computer lessons. The author found that students are more successful in learning *the basic concepts of computer* by means of an educational material based on the conceptual change approach.

Investigating how university students conceive the concept of computer, Vural, Yuksel and Coklar (2008) and Coklar, Vural and Yuksel (2010) found that students of Computer Engineering often produce metaphors about structural characteristics of computers whereas students of Computer Teaching produce metaphors about their functions. Furthermore, it was discovered that the latter group of students also produce metaphors about the educational aspect of computers. Erdogan and Gok (2008) studied how prospective teachers conceive technology through metaphor analysis, too. They observed that their perception significantly varies depending on gender, academic achievement and access to technology. Merdivan (2007) stated that different kinds of metaphors used for teaching hyper texts affect the connections established by students in hyper texts. Teleoacăl (2004) illustrated how important the metaphors used in computer terminology are in the process of translation. Leong (1988) dealt with learning of metaphors on computer whereas Falconer (2008) assessed the use of metaphors on online learning media.

A review of literature indicates that studies generally focus on determining the problems but solutions to these problems are often neglected. Furthermore, there are not any studies on the meanings assigned by children directly to the concept of computer. In the light of these facts, an attempt was made to depict children's mental structures concerning the concept of computer. Considering that concept mapping is one of the methods that can be used for revealing how children conceive the concept of computer -according to Anderson, Inman and Ditson (1996), it *makes concepts concrete, removes them from the mental world and facilitates learning concrete things*- (cited by Kilinc, 2007, 44), it should prove to be a favorable data collection tool. The researchers were motivated to use the method by

the fact that there was not any single study that designed the findings about children's world of learning concepts through concept mapping.

Materials and Methods

The study is based on a qualitative design and uses concept mapping in order to depict the meanings assigned by children in their minds to the concept of computer. Since the only purpose is to make a conceptual analysis, no statistical data are included. The stages of the design of the study are presented in Figure 1.

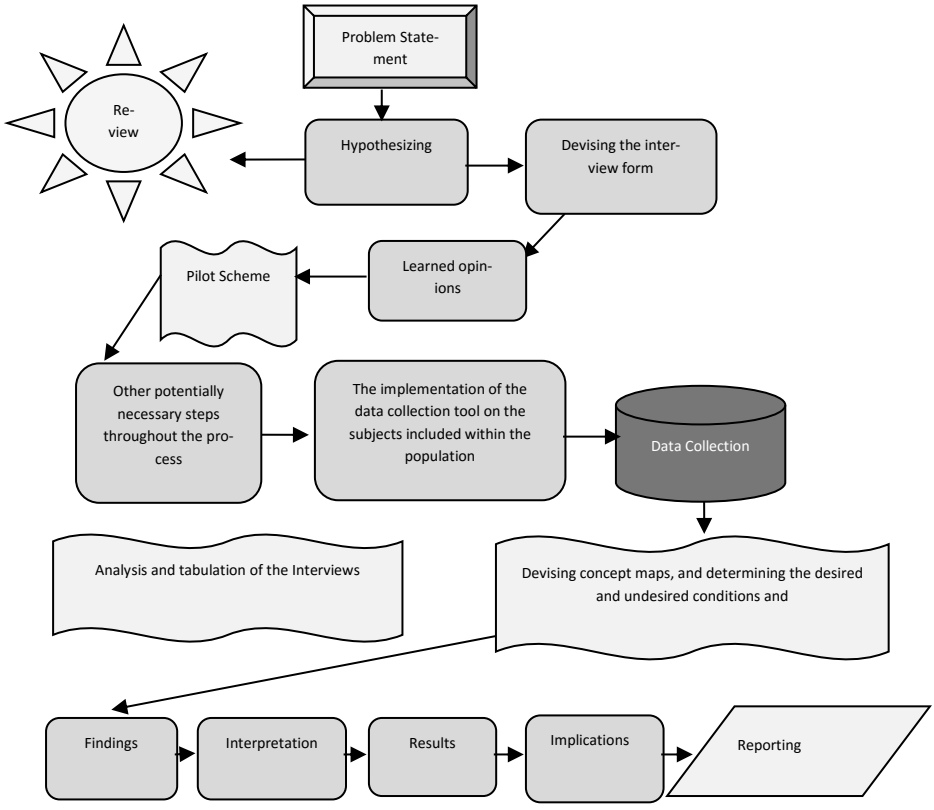

Figure 1.The stages of the study

Following problem statement, the review of literature commenced and continued till the stage of reporting. After the data collection tool was selected, it was implemented as a pilot scheme. Then, the actual implementation was carried out. The research report was prepared following data analysis and organization.

The Purpose of the Study: The purpose is to reveal what fifth grade students think about the concept of computer through concept maps and to show the meanings assigned by them to the concept on concept maps.

The population: The population was comprised of one hundred fifth grade students. The method of criterion sampling was used in order to determine the students to be interviewed. The underlying principle of this method is that all cases that meet a set of pre-specified criteria are studied. The criteria for the study were that the students must have a technological classroom with computers (TCC) and computer teachers in their school. Three classrooms thought to meet the criteria were selected from three different schools and interviews were conducted with them.

The Process of Devising the Data Collection Tools: As a data collection tool, an interview form was devised. The form consisted of questions that would reveal the meanings assigned by children to the concept of computer. The questions were composed in consideration for the curriculum of Information Technologies for primary schools and children's purposes of using computers. They were submitted to various specialists so as to determine whether they were appropriate for the purpose of the study and learned opinion was received (Erdemir, 2009). The form was finalized by omitting or revising the questions considered not appropriate for the purpose of the study.

Data Collection Method: In an attempt to unfold original ideas, brainstorming was employed during the implementation of the interview form. Open-ended questions were addressed to the students and the answers considered original were written on the board. The reason for doing so was to reveal the different concepts of computer in students' minds. Furthermore, a certain amount of time was allocated to all the students owing

to potential presence of shy ones. They were asked to rewrite their answers in the relevant section on the interview form that contained precomposed questions. In this way, an opportunity was given to the students who were not able to provide an answer during brainstorming or those who wished to add something to their previous answers. Moreover, an attempt was made to expand the map with sub-questions that would result from the answers provided by the students during the process of brainstorming.

Data Analysis: The data obtained throughout the implementation were computerized. They were analyzed through content analysis. A particular table was composed for each question and the relevant sub-question addressed to the children and the answers were analyzed. The analysis revealed the desired and undesired conditions. In addition, those concepts that resulted from misspelling were considered as undesired conditions or misconceptions. The data from these tables were turned into concept maps, as can be seen in the section of findings. The undesired conditions were made clear on the maps in order to point to their misconceptions. On the other hand, some of the concepts were presented among both the desired and undesired conditions. For instance, Counter-Strike is one of the answers provided by children to the question What games do you associate with computers most? It is a fact that Counter-Strike has been played by children for many years, and thus it is included among the desired conditions. However, it is also considered as an undesired condition seeing that it contains violence and has adverse effects on the behaviors of an individual. This fact was taken into account during the process of composing the concept maps. Furthermore, similar concepts were grouped and reflected on the maps. Since the primary objective of the study was to reveal the children's perception of computers and the conceptual correlations between these perceptions, no statistical data were presented, but the type of the metaphoric structure in their perceptions was taken into consideration.

Validity and Reliability: The present paper made an attempt to meet the validity and reliability standards required in qualitative research. In order to ensure credibility, the students, during brainstorming, were made to fill

the data obtained from brainstorming in the forms handed out before the implementation. Furthermore, great care was taken to receive answers from shy students and different answers from the ones filled in the forms. In this way, an attempt was made to receive answers from all the students. During the implementation, two or more individuals were voluntarily exposed to listening to the implementation and they were asked to confirm the data on the computer. Therefore, the proofs of validity and reliability were strengthened.

Results

The findings of the study and the interpretation regarding these findings are presented on concept maps. These figures include what the concept of computer connotes to children; computer games from their perspective; similarities/differences between human beings and computers; and advantages and disadvantages of computers to human beings.

What the Concept of Computer Connotes to Children

Figure 2. presents what the concept of computer connotes to children on a concept map.

It can be concluded that the children's perceptions mainly represent the desired conditions. A look at their perceptions indicates that they can express the areas in which computers are generally used and that they are quite aware of computers. It is observed that children have no perceptions that represent the undesired conditions. No negative forms of thinking are included among what the concept of computer connotes to the children. A metaphoric analysis of their perceptions suggests that they generally use functional metaphors about computers. Examples include such functions of computers as *information, MSN (messaging), music, speaker*, etc. Children assign structural metaphoric meanings to the concept of computer, too. *Electricity*, *a huge library* and similar expressions can be cited as examples. This finding supports those of Coklar, Vural and Yuksel (2010) and Vural, Yuksel and Coklar (2008). This finding might lead one to think

that those children who use structural metaphors will have a tendency towards engineering whereas those who use functional metaphors will be interested in computer teaching.

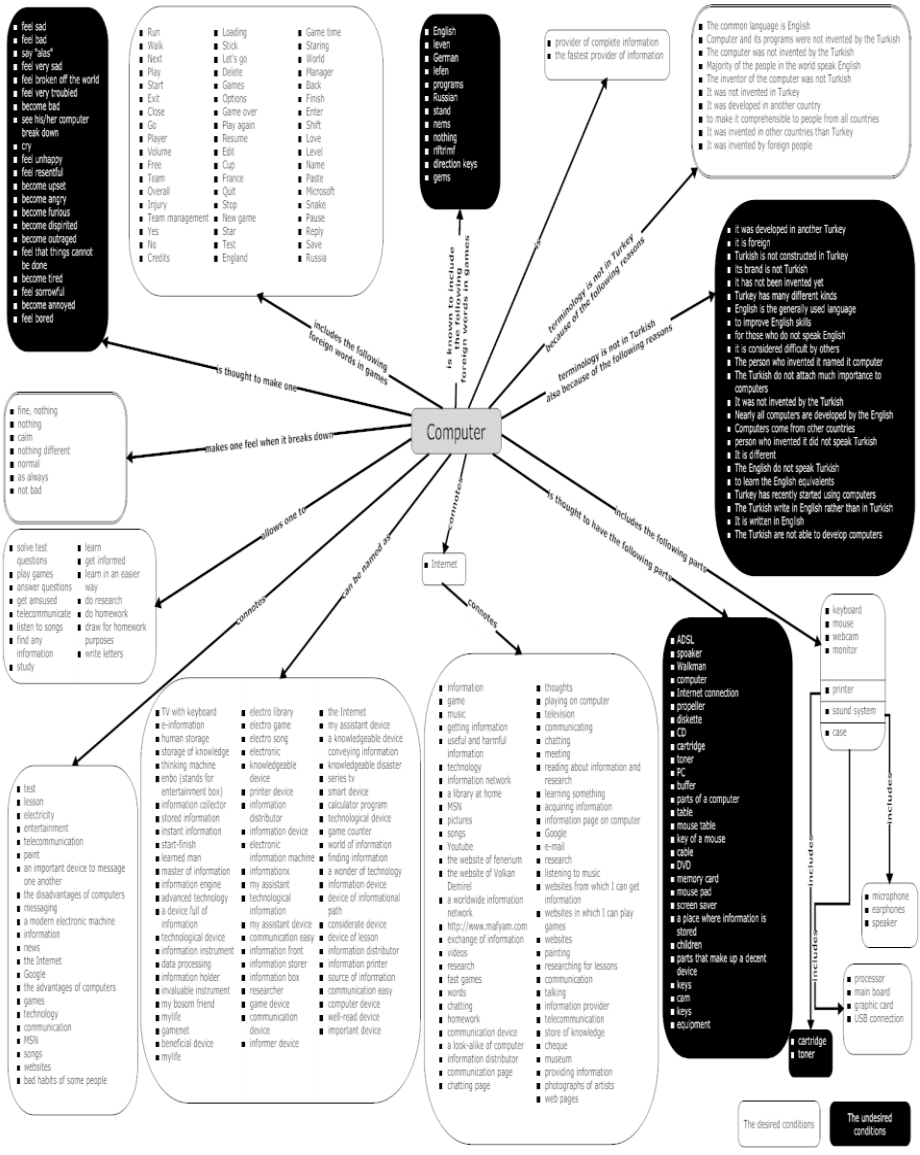

Figure 2. The concept of computer connotes to children on a concept map.

It is observed that the children generally coin compound names for computers. Furthermore, they sometimes make up imaginary, different and original names (enbo, arsisayar, etc.), though in small numbers. This might lead one to think that they are not very creative. A review of the names coined by children suggests that some of them are meaningless. Even so, they are included among the desired conditions owing the process of imagination involved. A metaphoric analysis of their perception shows that the concepts they substitute for computers have the characteristics of a human being rather than functional or structural metaphors. For instance, they coined the word *information writer* by combining *information* and *writer*, two properties owned by human beings. They also expressed the computer in the terms *my assistant*, *my bosom friend*, *considerate machine*, *knowledgeable machine* or similar other phrases. It can be argued that young children would rather use metaphors of personalization instead of structural or functional metaphors.

The children are familiar with nearly all parts of a computer (Figure 2). All the same, they assign undesired meanings to the parts of a computer such as *toner*, *propeller*, *buffer*, *table*, *speaker*. That the children regard any equipment about computers as their parts might indicate that they do have misconceptions. A look at the undesired conditions suggests that most of the expressions are about computers. For example, toner is a powder used in laser printers and photocopiers to form the printed text and images on the paper. In other words, it is a part of a printer. It is not directly related to a computer. Some of the undesired conditions result from misspelling. Furthermore, they consider external data storage units like *DVD* and *memory cards* as parts of a computer. This finding might lead one to think that they regard things around a computer as parts of a computer.

The children are aware of why computer terminology is not in Turkish. They maintain that this is caused by the fact that Turkey does not enjoy sufficient technological infrastructure. They also think that these concepts derive from English. This is the actual case when one enters any web-site on computer. The children believe that computer terms are coined in English because it is the most commonly used language in the world. However, some of the children gave the following reasons for why the names of the parts of a computer are not Turkish: *It still has not been invented*, *Turkish language is not constructed in Turkey*, *The person who invented it named*

it as computer, *The Turkish write in English rather than in Turkish*,*It was not the Turkish who invented it* etc., which are all included among the undesired conditions.

The children seem to be interested in the kind of web-sites that are based on entertainment or information purposes. As for the metaphors, they generally assign functional metaphors to the concept of the Internet. Examples include *information*, *game*, *communication*, *e-mail*, etc.

It is interesting that the children express their reaction when their computers break down as *it makes no difference*. In this case, they might have positive feelings about computers. Some of the children state that they feel *sad* or *bad* when their computers break down. They might react in a negative manner when their computers break down. They even *break off the world*, *feel angry*, etc. This finding indicates how addicted some children can be to computers. The phrase *breaking off the world* can be held as an example of structural metaphors. The children think that the phrase means *the inability to take pleasure from life* and *completely alienating oneself from it*.

The children encounter a lot of foreign words while playing computer games. Among the ones most encountered are *play*, *stop*, *Microsoft*, *snake*, etc, a fact which is not considered odd by the children. This finding might lead one to think that they have a positive attitude towards learning a foreign language and they can be taught a foreign language through computers in an easy way.

As far as computers are concerned, the first thing that comes to mind is computer games. It is interesting that the number of games that come to their mind is very high. This finding is an indicator of how far they are interested in computer games. Moreover, it seems that they have a wide vocabulary, which can be regarded as an advantage of computer games to education. On the other hand, they appear to have misconceptions about the foreign words they encounter while playing on computer. They confuse foreign languages with foreign words. No metaphoric findings are observed in their perception of computer games.

Computer Games from Children's Perspective

The children are exceedingly interested in computer games (Figure 3). In addition, they have a great deal of information about types of games, a fact presented among the desired conditions on the map. They group types of games under the following headings: tps (third person), intelligence, strategy, fight, action, sports, race, educational, adventure and others.

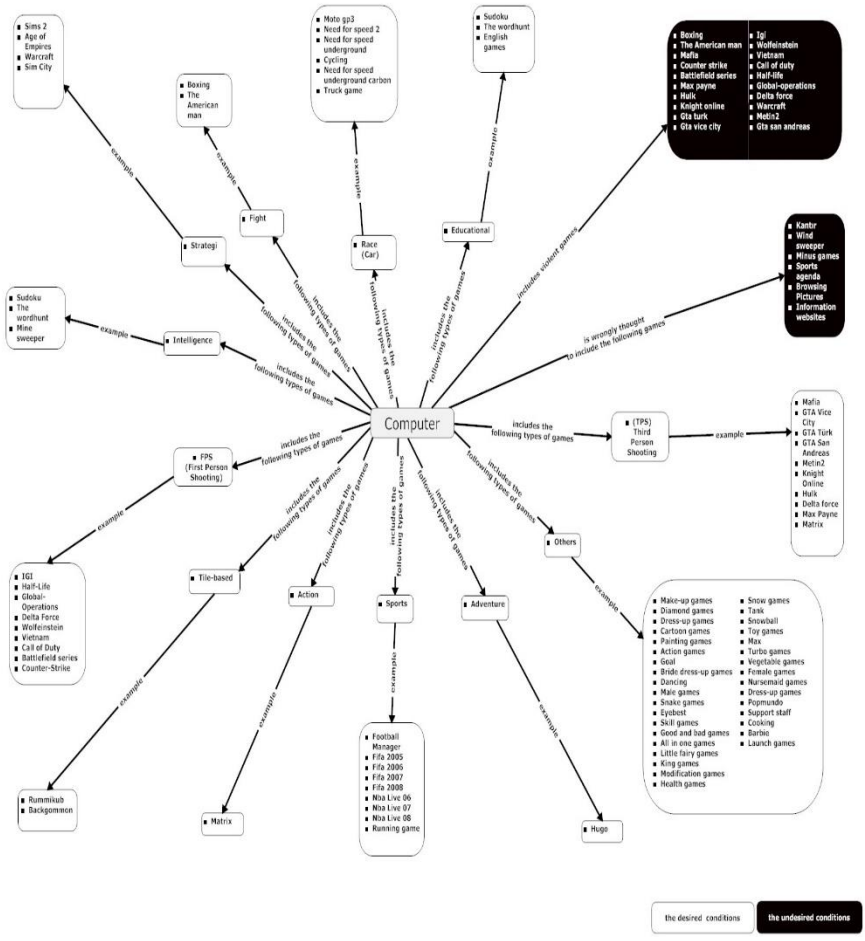

Figure 3. Computer games from children's perspective

The children make up names for or have misconceptions about computer games such as wind, minus games, browsing pictures, sports agenda etc. Some of these phrases are not a game and others are meaningless. They also play excessively violent games. It is known that excessively violent games have an affect on one's physical and physiological health; that such games prevent children from distinguishing between the real world and virtual world; and that children might have the same tendency to violence in their lives (Ozyutuncu Dogan, 2006). No metaphoric findings are observed in children's perceptions of categorizing computer games.

Similarities/Differences between Human Beings and Computers and Advantages/Disadvantages of Computers to Human Beings from Children's Perspective

The children generally base the similarities between computers and human beings on the notion information and they are quite conscious of the advantages and disadvantages of computers (Figure 4).

It can be concluded from the children's perceptions that they compare human beings to computers in mental ways. They also establish a part-organ relation between the two groups (computers have cams whereas human beings have eyes; both have a brain, etc.). Due to the fact that these relations have grounds, they are included among the desired conditions. According to the children, physical actions performed by human beings can be performed also by computers (both can play games, both can sing songs, etc.).

The children assign interesting meanings to computers such as the following: *human beingscan make sound whereas computers have a monitor*, *both human beings and computers have a memory capacity*, *memory of a computer resembles that of a human being*, *computers have a case whereas we have a brain* and so on. A review of the undesired conditions suggests that the children sometimes establish an inaccurate part-organ relation (human beings can make sound whereas computers have a monitor, computers have speakers while human beings have ears, etc.). They can be said to have misconceptions about drawing a parallel between computers and other things. A look into their perceptions of metaphors indicates that the children use structural and personalization metaphors. Examples include *both have a brain* (while the brain of human beings is an inherent organ, the one in

computers is a hardware known as processor. What is meant here is that both are units in which operations are carried out) or both are smart (human beings are smart; however, computers have codes that carry out pre-programmed operations).

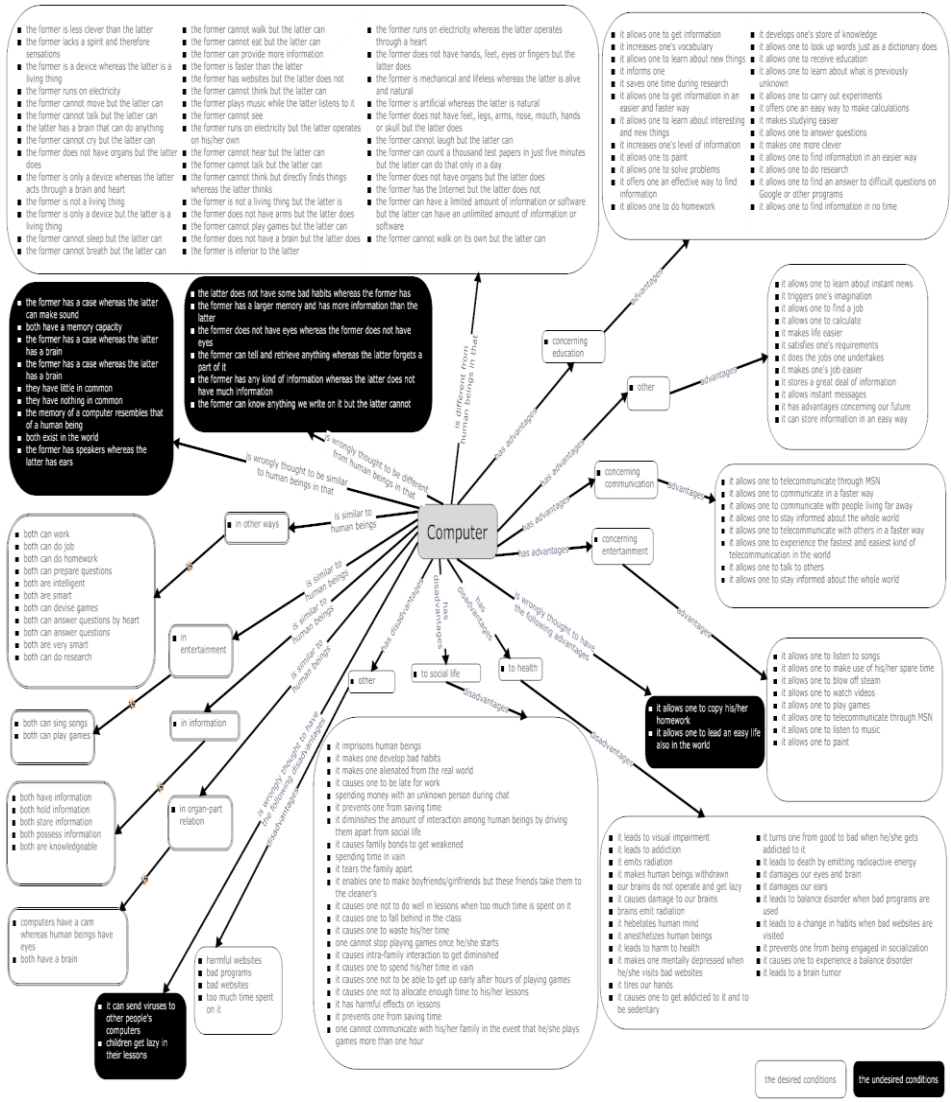

Figure 4. Similarities/differences between human beings and computers and advantages/disadvantages of computers to human beings from children's perspective

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The children are aware that human beings are natural and alive whereas computers are artificial and lifeless. They can distinguish between what is alive and what is lifeless. Furthermore, they know that some of the physical actions performed by human beings cannot be performed by computers. According to the children, it is clear that a computer cannot laugh or cry. They are aware of the fact that computers do not have emotions; that they, unlike human beings, cannot think; and that computes only obey the orders.

On the other hand, the children have some conflicting views such as *human beings do not have bad habits, which is not the case for computers* and *computers do not have eyes, but computers have*. They also have the following

misconceptions: computers know everything, they have a larger memory than human beings and any kind of evil and harm is caused by computers. It is observed that the children do not have metaphoric perceptions about the similarities and differences between human beings and computers.

The children list the advantages of computers as extensive research, lessons, homework, games, entertainment, telecommunication and communication. Those children who use computers for doing lesson and research regard them as a kind of library. Moreover, the children are aware that computers can perform, on their own, the functions of devices that include a number of multimedia features. According to them, it is an advantage of computers to provide instant news. This finding suggests that the children are familiar with news websites. On the other hand, they consider computers as an opportunity to copy their homework. This finding might indicate that they take the easy way out and copy their homework on the computer.

The children are quite conscious about the disadvantages of computers (the concept map in Figure 4). They place a particular emphasis on the disadvantages of computers to human health and social life. It is a known fact that radiation is harmful to human health (Mutlu, Senh and Toros, 2003). It can be concluded from their perceptions that the children are aware of this fact. Furthermore, computers are known to cause one to develop an addiction to them (Cengizhan, 2003). The children are observed to know about addiction to computers and what kind of harmful effects the addiction can have on their social life. They regard spending too much time on computers as a waste of time, which is a very positive perception. In addition, they stay informed about current news on the drawbacks of computers. Such expressions as *bad websites*, *bad software* and *developing habits by surfing bad websites* indicate that the children are aware of the fact that they might get harmed owing to the Internet or software.

The children express that other computers might send viruses to their computer, which suggests that they are not able to realize that computer-related threats are actually human-induced ones. They have such structural metaphors as *computers anesthetize human beings* (anesthetization occurs through tranquilizers or drugs taken by the body) and *computers imprison human beings* (imprisonment takes place in a prison; here they use the word to mean causing one to get addicted).

Discussion

The fifth grade students assign various meanings to the concept of computer and have several misconceptions about it. In addition to structural and functional ones, the metaphors they use are generally in the form of personalization. This finding might be considered natural seeing that children are more often engaged in concrete thinking.

Judging from the names they make up to refer to a computer, it can be argued that the children are not very creative. It is observed that the children are familiar with most of the parts of computers. Nevertheless, they wrongly consider the external storage units as parts of computers. Fifth grade students should be enabled to produce creative ideas and develop their metaphoric perceptions by getting them to read books on computers, to visit fairs, to watch visual materials and so on. Furthermore, they should be provided in their learning environment with the opportunity to reinforce what they know and to correct what they wrongly know.

The children have an idea about the disadvantages of computers to human health and social life. All the same, they overreact to computer breakdowns. The reason for this might be that they use computers and the Internet for entertainment purposes. As for types of games, they list fps (first person), tile-based, tps (third person), intelligence, strategy, fight, action, sport, race, educational, adventure and others. Therefore, children and parents should be informed about computer addiction and radiation emitted by computers. Moreover, parents should organize those activities that will teach their children to avoid anything that is harmful to their physiological health. Their overreactions to computers could be abated through support from guidance and psychological counseling units.

The fifth grade children are familiar with most of the foreign words they encounter while playing games, which indicates that it can be easy to teach foreign languages through computer games. It can be proposed that what children know, regardless of the lesson, should be maintained through games that are devised in accordance with the curriculum. Curriculum about computers might be based on the meanings assigned by children to the concept of computer.

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