



Students' views about computer use: Interviews with 8th graders

Sami Şahin *

Ayşe Alkan **

Abstract

We aimed to explore 8th grade students' computer use in this research. We carried out the research at Yaşar Doğu Elementary School in Kavak, a district of Samsun province in Turkey. We implemented semi-structured interviews to collect the data. We selected our sample from among volunteers of 3 different classes, striving to select students with different characteristics. Our study group consisted of 3 girls and 4 boys. We recorded interviews with a video camera. We found that students have Internet access in the home; they learn to use computers from their family members and relatives; they think computers positively affect their social lives; they mostly use computers on recreational days; they mostly use computers for fun, although they also do homework and online assignments with computers and the Internet; they do not follow any electronic media or publications; and they think that only their mothers lack knowledge about computers among the family members.

Keywords: Elementary students, computer use

* Sami Sahin, Gazi University, Ankara, Turkey, samisahin71@gmail.com

** Ayşe Alkan, Gazi University, Ankara, Turkey, ayshe_alkan@hotmail.com

INTRODUCTION

Every day, every hour, and even every minute, a new technological advancement appears for us. Improvements in science and technology also bring improvement in computer technologies. Currently, people make an effort to stay attuned to these improvements. These changes affect education, teaching, and learning (İşman, 2005).

Alkan (2005) remarks that education and technology are 2 factors that aim to make the world a more livable place. Yalın (2004) points to education and technology as disciplines playing the role of a bridge between science and practice.

Akkoyunlu (1995) states that information and communication technologies have enormous effects on societies. She asserts that change becomes inevitable after digital technologies diffuse in social life. She emphasizes that individuals need to be educated to develop the skills of accessing, creating, evaluating, presenting, and communicating knowledge. Likewise, Jonassen (2000) asserts that as a result of present technological improvements, individuals need to know basic concepts and issues about computers, hardware, software, programming, and technology maintenance.

Alkan (2002) defines 3 fundamental dimensions forming education. These are science, technology, and practice. He further states that improvements in science and technology have brought education to a new form, asserting that education should promote individuals to develop new scientific and technological qualities.

Baytekin (2004) notes that the results of 20th century wars, and especially World War II, created new technological and economic changes. He suggests that countries having difficulties in adapting to new teaching and learning conditions will be under the control of developed countries. Therefore, it is not possible to think about today's education apart from technology.

Yenice (2003) points out that the purpose of education is not only to provide individuals with knowledge, but also to show how and where they use it. Today's education aims to teach learners the skills needed to be information seekers and creators, rather than to simply transfer knowledge. Teachers and students need to possess the skills necessary to live in today's information societies. Skills for finding needed information, selecting valid and reliable data,

constructing and using one's own knowledge and communicating it with others, and working in teams have become basic abilities that students need to have (ISTE, 1998).

The use of computers in education has brought a number of new concepts. Information technology, computer training, computer awareness, computer literacy, Internet literacy, and information literacy are the most commonly used terms among them. Educational institutions are organizations functioning around these new concepts. Educating people to equip themselves with computer and information literacy skills and to become self-learners is among the responsibilities of educational institutions, since their ultimate responsibility is to train individuals in accordance with the human profile that society needs (Kurbanoglu and Akkoyunlu, 2003).

Although computer and Internet use involve a large audience, the vast majority of computer users are young people. More prone to learning and more open to the adoption and implementation of innovation, young people constitute a huge potential for this area (Stephen et al., 1999).

As today's student-centered concept of education is based on the belief that knowledge is created by learners, determining students' views and perceptions of computer use will help instructional designers and teachers in the planning and implementing of the appropriate teaching activities for the learners.

Digital equity and access are critical in assessing how computer has come into use in everyday life. Studies show that gender is as a key socio-cultural determinant in computing. Culture is a complex whole that includes knowledge, beliefs, arts, morals, laws, customs, and any other capability, habit and bias by a human being as a member of society (Usun, 2006). One of the biases still seen in the world that computers are boys' machines. Studies showed that girls use computers less frequently than boys (Giaquinta et al., 1993; Barker, 2006; Kay, 2006) and boys spent most of their computer time on video game play (Provenzo, 1991; Cassell and Jenkins, 1998; Butler, 2000). In schools, girls often seem less interested in participating in computer activities (Hawkins, 1987; Shashaani, 1994; Imhof et al., 2007) or have a harder time getting access to computers (Schofield, 1995; Imhof et al., 2007).

Socioeconomic background also plays an important role in access to computers at home and there is an unequal distribution of computers and Internet access among socioeconomic status (Lazarus and L. Lipper, 1994; Sutton, 1991; Barker, 2006; Kay, 2006). Families with higher

incomes and higher education levels were more likely to own computers and to have Internet access from home (Calvert et.al., 2005). Studies suggest a number of direct and indirect relationships between socio-economic background, computer experience, and amount of computer use. Bozionelos (2004) found a positive path from socio-economic background towards computer experience, because individuals who have been reared within more privileged socio-economic environments are expected to report greater experience in using computers.

Many efforts have been put by Turkish government to ensure that schools are not left behind in terms of ICT development especially in term of computer and internet usage (Akbaba-Altun, S., 2006). In 1998, with a loan from the World Bank Turkish government invested in a two-phase National Basic Education Program (BEP) and distributed 56,605 computers to 26,244 rural area elementary schools and trained 25,000 elementary school teachers on computer literacy in various in-service programs (Akbaba-Altun, S., 2006). Since that time computers and computer literate teachers have increased dramatically in the schools. However there are issues to be explored and developed for the effective use of the computers in teaching and learning. This study is an effort to explore students' computer use and its relationship with families and social environment. We aimed that the result of this study will guide programmers in the planning of computer-aided instruction. We anticipate that the results of this study will offer useful data for computer technology teachers and researchers who are interested in the teaching of computer technology and its use in education.

Purpose

The purpose of this study was to learn students' opinions and thoughts about their computer use. For the purpose, this study sought answers to the following research questions.

1. How the students learn to use computers?
2. How the students use computers in their daily lives?
3. How the students benefit from using computers?
4. How the students follow computer technology?
5. How the students use computers and the Internet in the home?

METHOD

To determine students' opinions about their computer use, we used a semi-structured interview technique in the study. According to Punch (2005), an interview in qualitative research can be structured, semi-structured, or unstructured. The interview questions were prepared with the assistance of 4 subject area experts. A Turkish language expert also examined the interview questions, and expressions were corrected accordingly.

We carried out this research among 8th grade elementary school students enrolled in an elective information technologies course at Yaşar Doğu Elementary School, which is located in the district of Kavak, Samsun. Our sample consisted of 4 male and 3 female volunteer students; 2 girls and 2 boys were from A and B classes, and 2 boys and 1 girl were from C classes. We selected the interviewees just before the interview, to prevent them from preparing for the interview. Our interviewees were from similar cultural and economic backgrounds. A semi-structured interview technique was used in the research. Thus, we had the opportunity to collect in-depth views from students about their use of computers. We carried out the research during the spring semester of the 2009-2010 academic year.

We carried out the interviews one by one in the computer laboratory of the school, after the end of the school day. The interviews were conducted by one of the researchers and were recorded by video camera. Although at the beginning of the interview, students experienced uneasiness and embarrassment, they increasingly grew more comfortable. Interview recordings were converted to text by one of the researchers. The other researcher also checked the consistency of the written text and the records.

Data Analysis

We used the descriptive analysis technique to analyze the data. The analysis was carried out in 4 stages. These phases were: creating a thematic framework, processing the data according to the framework, identifying the findings, and interpreting the findings.

We converted the video records to text. The boys were symbolized with letters X1, X2, X3, X4, and the girls were symbolized with Y1, Y2, and Y3. We categorized the data without any quantification. All of the data were included in the analysis.

Both researchers analyzed the data independently and then summed the results. The purpose here was to increase the internal reliability of the results. We also tested the credibility of the

data by sharing it with 2 separate computer teachers. As a result of the analysis, we were convinced that the findings were clear and credible. We kept students' identities secret, but we also provided optimal information about the students and the school setting so that the reader can establish the link between the data and the sample.

FINDINGS and DISCUSSION

You find here our interpretation of the students' answers to the interview questions.

How do elementary students learn to use computers?

Tor and Erden (2004) found that the school environment lags in teaching students to use computers, just as Börü (2010) found that a majority of students learn to use computers by themselves. Similarly, our interviewees expressed that they learn to use computers by observing their family members and their relatives. They also learn to use computers by playing games. The result shows that the role of family and social environment in learning computers is so important and deserves more attention to be researched further. The result suggests that educating families about new technologies is critical to successful integration of computer technologies into education. The result also indicates that educators would develop, use and investigate educational games for teaching and learning computers more.

Below are students' answers to the question, "*How did you learn to use computers?*"

(X1): "*There was a computer in our house; my father had bought it for his own work since he works in a court house. I learned how to use the computer by watching my elder brother and playing games. I didn't take any private computer course or lesson, but took one course in the public school.*"

(Y1): "*A few people had computers among my relatives. So, I learned how to use computers from my relatives when I visit them. I learned the computer also by playing games and from my teacher who teaches computer courses.*"

(X2): "*We had a computer in our home, and some books on computers; I learned by myself.*"

(Y2): "*I learned by myself, and my elder brother taught me, also. I didn't go to any computer course outside the school.*"

(X3): *"I had learned how to use computers from my relatives living in Samsun before we bought a computer to our home. Afterwards I learned different skills when I took a computer course. It was easy for me since I learned it before."*

(Y3): *"I learned how to use the computer from my teacher when I went to 4th and 5th grade, and also learned from my elder sibling, who studied higher education at college."*

(X4): *"I learned how to use the computer while watching my uncle's son who uses the computer when it is brought to our shop."*

How do elementary students use computers in their daily life?

Bonn et al. (1998) state 3 different functions of the Internet: communication between individuals, interaction in training and leisure time, and information transfer between agencies. Ersoy and Yasar (2010) found that students mostly use computers for connecting with others and for entertainment. Wayne and Turkkan (2009) found that students use computers for game-playing and Web searches. Similarly, our interviewees mentioned that they use computers for gaming, communicating, and collecting data for their assignments. This result suggests that educators would find ways to integrate educational games, social spaces and search machines into teaching and learning.

Below are students' answers to the question, *"How do you use computers in your daily life?"*

(X1): *"Mostly games, entertainment purposes (chat, Facebook, music), and I use it for doing web research for my homework. I do my assignments without any difficulty; I can find direct available information."*

(Y1): *"Entertainment purposes, like chat, listening to music, playing games; I use it mainly for entertainment purposes. Makes my assignments pretty easy. For example, I can find things on the computer that I cannot find in books. Rather, it works to find pictures, it makes things easier."*

(X2): *"My sister is away, I talk with her by e-mail. I am wrestler, I watch wrestling videos, I learn tactics from them."*

(Y2): *"In general, I use MSN and Facebook."*

(X3): *"I use it for my assignments; I can meet remote people and it allows us to communicate easily."*

(Y3): *"I usually use it for my homework, because I am not a member of MSN or Facebook. I do not want to waste my time. It is very hard to do assignments with books, it is faster by computer."*

(X4): *"When we are bored we can spend time with the computer."*

How do computers and the Internet affect elementary students' social life?

Our participants insisted that they use computers and the Internet for good purposes, and that they were affected positively. They explained that they communicate with their friends via the Internet and become more social. However, Hormone and Ark (2005) found that children who excessively use the Internet and spend much time playing computer games have decreased self-confidence, increased anxiety, and increased aggressive behaviors. We conclude here that we need further research to explore how schools, families, and students can identify negative effects of computers and the Internet, to then take actions to protect our children.

Below are students' answers to the question, *"How does computer use affect your social life?"*

(X1): *"I believe that it affects me positively. So I stick to the computer. I usually play football with my friends. Sometimes I play with them outside. Sometimes I go to an Internet cafe and play games with my friends there."*

(Y1): *"It doesn't affect my relationship with my friends and family negatively since I don't spend much time on the computer. I don't spend time much with my family, either. Usually I spend time on courses with my friends."*

(X2): *"It affects me positively. I find my old friends and talk with them on the Internet. It doesn't affect me negatively in any way."*

(Y2): *"It affects me more positively. I can meet with my friends from far away; I see their pictures on the Internet. I make new friendships on the Internet, also."*

(X3): *"I prefer to use computers for good purposes."*

(Y3): *"It doesn't affect me negatively."*

(X4): *"It doesn't have any negative effect on me. I spend all my time at the computer."*

How many hours do elementary students spend using computers per day?

Günel, Turhal, and İmal (2010) found that adolescents spent 1-3 hours daily on the Internet. Similarly, our students reported that they use computers 1-3 hours daily. However, they pointed out that these hours are subject to school days and increase on weekends and holidays. On the other hand, Sanders et al. (2000) assert that spending too much time on the Internet causes not only social and mental deterioration but also muscle and skeletal problems, because of improper sitting habits and inappropriate computer seats and tables. They concluded that excessive computer use even causes sight and speech problems and brain disorders. We recommend that district administrators arrange meetings and seminars to inform school administrators and families about the importance of appropriately designed spaces for computer use and control of students' use of computers. Additional seminars are also recommended for students, to teach them the bad effects of inappropriate use of computers and the Internet.

In addition, girls stated that they do not feel confident entering the public Internet cafes in Kavak. Therefore, we recommend that the Kavak municipality provide girls and women with special computer cafes and access to the Internet.

Below are students' answers to the question, "*How many hours do you spend using computers per day?*"

(X1): "*There are some days I use the computer many hours. But we have the nationwide entrance exam for high schools nowadays. So, recently, I can't spend much time at the computer. But I do it at least 2 hours after the examination. Also, the summer holiday is close. It may be 5 or 6 hours during the holiday. I go to the Internet cafes with my friends to play at workstations since we can't do it at home. That is for one hour at most.*"

(Y1): "*Three hours at most. We have a computer at home but not the Internet. I use it at my aunt's or at the school. I don't go to the Internet cafes since my family does not allow it. Moreover, there is no Internet cafe here specifically for girls.*"

(X2): "*Up to half an hour or 1 hour. I don't have a habit of going to Internet cafes.*"

(Y2): "*One hour at most. I am going to my aunt's when I need to use a computer. I also use it at the school. I don't prefer Internet cafes. I don't think that they are appropriate places.*"

Others in the cafe see what people you are communicating with and what you write. I don't feel confident there."

(X3): *"Only if I have to go to the Internet cafes for an assignment, I go. I do not sit there so much. At most for an hour and a half if I have permission from my family."*

(Y3): *"An hour, an hour and a half, at my father's workplace. I don't go to the Internet cafes often, I do not prefer them. Here girls hesitate to enter the Internet cafes."*

(X4): *"I spend about an hour, an hour and a half, at my father's store. I go to the Internet cafes together with my elder brother sometimes."*

How do elementary students follow improvements in computer technology?

Korkmaz and Mahiroğlu (2007) found that computer and Internet usage shows differences depending on the education level of users. They state that as education levels increase, computer use appropriate to information society increases; as education levels decrease, inappropriate computer use and Internet addiction increase. They suggest that people still need to be educated about why, when, and how to use the Internet. We further suggest that people need to be educated about how to follow and deal with changes in computer and Internet technology, since we heard from our interviewees that they do not specifically follow improvements in computers, but only hear about them from television and the Internet. The result shows that the curriculums of the computer education courses are not enough for the students to catch rapidly changing technological world. Therefore other information channels would be integrated into school curriculum such as up to dates magazines, TV programs and the Internet sites.

Below are students' answers to the question, *"How do you follow the developments in computer technology?"*

(X1): *"I follow by the Internet and from the TV. There is no periodical I subscribe to."*

(Y1): *"Not much; I hear from my friends a bit, not from any other source, no periodical."*

(X2): *"I prefer to follow by the Internet."*

(Y2): *"Sometimes from the Internet."*

(X3): *"I follow by the Internet."*

(Y3): *"Sometimes I follow. But I don't search for any improvements specifically."*

(X4): *"I usually follow from the TV."*

Who use computers and the Internet in the students' family?

The "Household Information Technology Use Survey," carried out by the Statistical Office of the Prime Ministry of Turkey (TÜİK) for year 2009, revealed that 30% of people have Internet access at home, while 30% of the participants without Internet access stated that they did not need it (TÜİK, 2009). Similarly we found that most of the families of our participants did not have Internet access, although they do have a computer at home, and most of the family members, except for the mothers, knew how to use it. We recommend that school administrators arrange courses for mothers to educate them about computer usage, so that they can monitor, control, and even teach their children to use computers appropriately.

Below are students' answers to the question, *"Who uses computers and the Internet in your family?"*

(X1): *"My father uses it. My elder brother and I even are professional. My mother knows only to close a window by clicking (X). She can't use the mouse, she had trouble moving it."*

(Y1): *"We have a computer in the home, but not the Internet. My father, my sister, my younger brother, and I know how to use it. My mother can't use it. She knows nothing about it, even."*

(X2): *"My elder sister is a secretary, she knows it. My father and younger brother also know how to use it, but not my mother."*

(Y2): *"My sisters, my father, my mother, and I all use the computer."*

(X3): *"We don't have a computer at home. There is one at my father's workplace. We all know to use it, except for my mother."*

(Y3): *"We have a computer and the Internet. My brother and I use it. My father knows it a bit, but my mother knows nothing."*

(X4): *"We have a computer at home. All my family members know how to use it."*

RESULTS and RECOMMENDATIONS

As information and communication technologies are progressing rapidly, computers and the Internet are becoming an important part of our daily lives. Although we know that using computers and the Internet have some negative effects on children's physical, social, and psychological states, we cannot prevent their usage. However, we can teach them about appropriate uses of computers. We know that being computer literate does not mean using computers as hardware and software, open it and click it, rather it means using computers to make the life easy and better. This is possible only if one know how to benefit it. Therefore computer courses in the curriculum have to pieces of computer literacy. The courses can also include and inform families about the bad effects of computers and the Internet in the case of excessive and wrong use through seminars.

We know that the role of families in learning, especially in smaller class levels, is so critical that we need to include them in the learning process of our students. Our study revealed that students learn much to use computers through observing their family members and relatives. This finding suggests that we would benefit from the support of families. Our findings showed that family members other than mothers do generally use computers. Thus, we recommend that school administrators organize seminars for mothers, to teach and encourage them to use computers.

We found that students use computers mostly to do homework and have fun. They do not follow any digital or printed material to track technological improvements. We recommend that schools subscribe to computer magazines and make them available for their students, to inspire them about the use of new technologies. Even up to dates information channels such as magazines, TV programs and the Internet sites would be integrated into school curriculum. We recommend also that educators develop, use and investigate educational games for teaching and learning computers more.

Finally, in today's information and communication age, schools should pay more attention to students' use of computers in order to train them to use technology effectively, so that they can create and communicate the knowledge they need to live.

REFERENCES

- Akbaba-Altun, S. (2006). Complexity of Integrating Computer Technologies into Education in Turkey. *Educational Technology & Society*, 9(1), 176-187.
- Alkan, C. (2002). Anadolu üniversitemizin durumu. *Açık ve Uzaktan Eğitim Sempozyumu*. 23-25 Mayıs 2002, Eskişehir, Turkey.
- Alkan, C. (2005). *Eğitim Teknolojisi (8. Baskı)*. Ankara: Anı Yayıncılık.
- Akkoyunlu, B. (1995). Bilgi teknolojilerinin okullarda kullanımı ve öğretmenlerin rolü. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 11, 105-109.
- Akkoyunlu, B. ve Kurbanoğlu, S. (2003). Öğretmen adaylarının bilgi okuryazarlığı ve bilgisayar öz-yeterlik algıları üzerine bir çalışma. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 24, 1-10.
- Barker, L. J., & Aspray, W. (2006). The state of research on girls and IT. In J. M. Cohoon & W. Aspray (Eds.), *Women and information technology* (pp. 3–54). Cambridge, MA: MIT Press.
- Baytekin, Ç. (2004). *Öğrenme öğretme teknikleri ve materyal geliştirme (2. Baskı)*. Ankara: Anı Yayıncılık.
- Bozionelos, N. (2004). Socio-economic background and computer use: the role of computer anxiety and computer experience in their relationship. *International Journal of Human-Computer Studies*. 61(5), 725-746.
- Börü, D. (2010). Öğrencilerin bilgisayar ve internet kullanımına ilişkin bir araştırma. *Marmara Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*. 15(4), 4-16. Retrieved March 29, 2011, from <http://www.econturk.org/Turkiyeekonomisi/deniz3.pdf>
- Butler, D. (2000). Gender, girls, and computer technology: What's the status now? *Clearing House*, 73(4), 225–229.
- Calvert, S. L., Rideout, V. J., Woolard, J. L., Barr, R. F., & Strouse, G. A. (2005). Age, Ethnicity, and Socioeconomic Patterns in Early Computer Use A National Survey. *American Behavioral Scientist*. 48(5), 590-607.
- Cassell, J., & Jenkins, H. (1998). *From barbie to mortal kombat: gender and computer games*. Cambridge, MA: MIT Press.
- Ersoy, A. & Türkkan, B. (2009). Perceptions about internet in elementary school children' drawings. *İlköğretim Online*, 8(1), 57-73. Retrieved March 29, 2011, from <http://ilkogretim-online.org.tr/vol8say1/v8s1m6.pdf>
- Ersoy, A. & Yaşar, Ş. (2010). *İlköğretim 4. ve 5. sınıf öğrencilerinin internet kullanma durumları*. MS Theses, Anadolu Üniversitesi Eğitim Bilimleri Enstitüsü, Eskişehir, Turkey. Retrieved March 29, 2011, from http://www.tebd.gazi.edu.tr/arsiv/2003_cilt1/sayi_4/401-426.PDF

- Giaquinta, J. B., Bauer, J. A., & Levin, J. E. (1993). *Beyond technology's promise: an examination of children's educational computing at home*. London: Cambridge University Press.
- Günel, A., Turhal, Ç. Ü., & İmal, N., (2011). İlköğretim öğrencileri arasında internet kullanımının incelenmesine yönelik anket çalışması. 4. Ağ ve Bilgi Güvenliği Sempozyumu, Ankara, Turkey. Retrieved March 29, 2011, from http://www.emo.org.tr/ekler/a3ab9ab93998aad_ek.pdf
- Hawkins, J. (1987). Computers and girls: rethinking the issues. In *Mirrors of Mind: Patterns of Experiences in Educational Computing*, Pea R. and Sheingold K. (Eds.), Ablex, Norwood, New Jersey, 242-257.
- Imhof, M., Vollmeyer, G., & Beierlein, C. (2007). Computer use and the gender gap: The issue of access, use, motivation, and performance. *Journal Computers in Human Behavior archive Volume*, 23(6), 2823-2837.
- İşman, A. (2005). *Uzaktan eğitim (2. Baskı)*. Ankara: Pegem A Yayıncılık.
- Kay, R. H. (2006). Addressing gender differences in computer ability, attitudes and use: The laptop effect. *Journal of Educational Computing Research*, 34, 187-211.
- Kafai, Y. B. & Sutton, S. (1999). Elementary school students' computer and internet use at home: current trends and issues. *Journal of Educational Computing Research*, 21(3) 345-362.
- Korkmaz, Ö. & Mahiroğlu, A. (2007). İnternet kafelerin kullanım amaçları, yanlış alışkanlıklar ve eğitim düzeyine göre farklılıklar. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergis.* 8(2), 99-116.
- Provenzo, E. (1991). *Videokids*. Cambridge:Harvard University Press.
- Punch, F. K. (2005). *Sosyal araştırmalara giriş nitel ve nicel yaklaşımlar*. (D. Bayrak, H. B. Arslan, & Z. Akyüz, Trans.). Ankara: Siyasal Kitabevi.
- Schofield, J. W. (1995). *Computers and classroom culture*. New York: Cambridge University Press.
- Shashaani, L. (1994). Gender differences in computer experience and its influence on computer attitudes. *Journal of Educational Computing Research*, 11(4), 347-367.
- Sutton, R. E. (1991). Equity and computers. *Review of Educational Research*, 61(4), 474-505.
- Tor, H. & Erden, H. (2004). İlköğretim öğrencilerinin bilgi teknolojilerinden yararlanma düzeyleri üzerine bir araştırma. *The Turkish Online Journal of Educational Technology*, 3(1), 120-130.
- TÜİK, (2009). 2009 yılı hane halkı bilişim teknolojileri kullanım araştırması sonuçları. Retrieved from <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=6308>

Usun, S. (2006). The role of the socio-cultural context in designing appropriate support services and enhancing interaction in distance education in Turkey. *Turkish Online Journal of Distance Education-TOJDE*, 7(3), 57-69.

Yalın, H. İ. (2004). *Öğretim teknolojileri ve materyal geliştirme*. Ankara: Nobel Yayınevi.

Yenice, N. (2003). Bilgisayar destekli fen bilgisi öğretiminin öğrencilerin fen ve bilgisayar tutumlarına etkisi. *The Turkish Online Journal of Educational Technology*, 2(4), 79-85.