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Students' opinions regarding the usage of computer technologies in constructivist learning environment

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Abstract
The aim of this study was to determine the opinions of the eight grade students using computer technologies in constructivist learning on science and technology course. The research was carried out in an elementary school in İzmir, in spring semester of 2007-2008. 47 students participated in the study group in all, consisting 24 students in the experimental group and 23 students in the control group. The study lasted in fife weeks. The courses were performed according to the constructivist learning based activities in the experimental group and the traditional teacher-centered approach in the control group. Student opinion form developed by the researches as a means of gathering data. Content analysis and frequency analysis methods were used to analyze the data. It was determined that there were some changes in the opinions of students in the experiment and control group related to the usage of computer technologies on science and technology course.
Keywords: Science and Technology Education, Constructivist Learning, Computer Technologies

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Öğrencilerin yapılandırmacı öğrenme ortamlarında bilgisayar teknolojilerinin kullanımına yönelik görüşleri

Özet:

Bu çalışmanın amacı, Fen ve Teknoloji dersinde yapılandırmacı öğrenmeye dayalı düzenlenen öğretim ortamında ilköğretim sekizinci sınıf öğrencilerinin bilgisayar teknolojilerine yönelik görüşlerini belirlemektir. Araştırma 2007-2008 bahar yarıyılında, İzmir ili Buca ilçesinde bulunan bir resmi ilköğretim okulunda gerçekleştirilmiştir. Deney grubunda 24 kontrol grubunda 23 öğrenci olmak üzere toplam 47 öğrenci çalışma grubunda yer almıştır. Çalışma beş hafta sürmüştür. Dersler deney grubunda yapılandırmacı öğrenmeye, kontrol grubunda ise öğretmen merkezli geleneksel öğretime göre düzenlenmiştir. Çalışmada veri toplama aracı olarak araştırmacılar tarafından geliştirilen öğrenci görüşme formu kullanılmıştır. Verilerin analizinde içerik analizi ve frekans analizi teknikleri kullanılmıştır. Yapılan analizde deney ve kontrol grubundaki öğrencilerin Fen ve Teknoloji dersinde bilgisayar teknolojilerinin kullanımına ilişkin görüşlerinde bazı değişiklikler olduğu saptanmıştır.

Anahtar Sözcükler: Fen ve Teknoloji Eğitimi, Yapılandırmacı Öğrenme, Bilgisayar Teknolojileri

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Introduction

Recent advances in science and technology have changed the structure of education systems. Today many countries are trying to invert their current education systems into a system in which the students are more active because it is impossible to grow up people who can think, investigate and resolve within the traditional education systems (Aydede, Kesercioğlu, 2008); Furthermore, rapid improvements in computer technology allow us to consider the use of computer technologies in science education. It is obvious that alternative teaching approaches needed to teach in science education. (Çepni, Taş, Köse, 2004). There is no suspect that constructivism is a major theoretical influence in contemporary science education (Matthews, 2002); so we can say that computer technologies based constructivist learning environments will be a useful method for the students.

Some educators have tried to define the features of constructivist learning environment for about ten years (Gijbels and his colleagues, 2006). The constructivism is a learning approach improved by Piaget, Asubel, Von Glasserfeld and Vygotsky that the individuals construct their knowledge on their own and responsible for their own learning (Açıkgöz, 2007; Bahar, 2006). The social constructivism of Vygotsky (1978) provides a foundation for collaborative, argumentative and reflective activities in technology-enhanced learning environments (Blake, Scanlon, 2008). Such being the case, it is expected that the students will be able to construct knowledge meaningfully by being active in courses and undertaking the responsibility of their own learning. Using computer technologies gives students the opportunity to observe a real world experience and interact with it (Yenice, 2003) and provides opportunities to construct knowledge by analyzing and interpreting in computerized learning environments. Recent researches in information and communications technologies can be practices in science education. Among these all technologies, the use of computers is the most popular and well known in educational settings. Although teachers thought computer technologies applications are difficult to transfer to classroom practice (García-Valcárcel and Tejedor, 2009), computer-assisted instruction takes an important role in contemporary teaching and learning of science education (Chang, 2001).

In studying the literature of using computer technologies, many studies adopt a rather limited view because only technology-related variables, such as attitudes to computers and computer experience were taken into account (Hermans, et al., 2008) According the Chou

(2005), the computer technologies are able to use such as project preparing, community building, video-conferencing etc.

Into consideration, the purpose of this study is to determine elementary school students' opinions about using computer technology within the constructivist approach in science education in Turkey. This investigation addresses the following questions:

1. What are students' purposes of using the computer technologies?
2. What does students understand the concept of computer technologies'?
3. Do students want to use computer technologies in science and technology course? And why?
4. How the computer technologies can be used in science and technology course?
5. What are the students' opinions about the usage of computer technologies in science and technology course?

Methodology

The research was organized according to experimental design having pretest and posttest with control group. In the experimental design is used to determine the relationship between the different factors affecting a process and the output of that process. It is important to organize the experiment and answer the questions of interest as clearly and efficiently as possible (Broota, 1989). The research was carried out in an elementary school in İzmir, with eight grade students, in spring semester of 2007-2008. 47 students in total including 24 students in the experiment group and 23 students in the control took part in the study groups. The study lasted for 5 weeks. The courses were performed according to the constructivist learning based activities in the experimental group and the traditional teacher-centered approach in the control group.

Usage of Computer Technologies in Constructivist Learning

In this study, computer technologies based constructivist learning environment organized according to active construction of new knowledge and prior knowledge of students. In the process of the study, students drive their own learning process and build their concepts on what they already know. Online dialogue with students, using internet, researching tasks, power point presentation and so on, help them to construct their own knowledge.

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During these activities, teachers are flexible; sometimes they are the giver of knowledge, but often are the facilitator. They ask questions, give models and instruct the students, Moreover, the students provided feedback, cognitive structuring and prolepsis when they are working on learning material (Postholm, 2006).

Instrument and Data Analysis

'Student Opinion Form' was used as a data collection tools. While developing the form, local and foreign literatures were reviewed and the students' opinions were taken. By means of the data gained from the literature review and students' opinions, fife open ended questions were determined. And these questions were revised according to experts' opinions. These questions were;

- What is your purpose of using the computer technologies?
- What comes to your mind about computer technologies?
- Do you want to use computer technologies in science and technology course? Why?
- How do you use computer technologies in science and technology course?
- What is your opinion about the use of computer techn. in science and technology course?

Content analysis and frequency analysis methods were used to determine opinions of eight grade students regarding using computer technologies in constructivist learning approach.

Findings

This part includes the findings of the research. The first open ended question intended for identifying opinions of eight grade students relating to applications of computer technologies in constructivist learning environment in science and technology course was "What is your purpose of using computer technologies?" The frequency values concerning the students' answer about the open ended question were denoted at Table 1.

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Table 1
The Students Opinions Regarding the First Open Ended Question

What is your purpose of using the computer technologies?					
	Codes	f	Sample Expressions	**f**
Experiment Group	Research based	16	I reach information faster while doing my homework…	24
	With the aim of preparing homework	7	I use it to obtain more comprehensive information while doing my homework…	
	With the aim of fun	1	I used it to make research…	
Control Group	Research based	12	I use to do homework when the teacher gives homework…	23
	With the aim of preparing homework	8	I use in order to play…	
	With the aim of fun	3	I use to learn new information	

As a result of the analyses concerning the first open ended question, it was detected that 16 students used the computer in order to make research; seven students used the computer so as to do the homework and one student uses the computer to do the homework and one student uses computer for games.

Secondly, the question of "What comes into your mind about computer technologies?" was asked in order to determine the opinions of the eight grades students about computer technologies in science and technology course. The frequency values concerning the answers given to this open ended question by the students given in Table 2.

Table 2
The Students' Opinions Related To the Second Open Ended Question

What comes to your mind about computer technologies?				
	Codes	f	Sample Expressions	**f**
Experiment Group	To make research	13	To learn new information…	20
	That the computer is a means of communication	4	To be able to speak with my friends in the internet	
	Fun	3	That it provides making research	
Control Group	To make research	7	Making surfing in the internet	18
	That the computer is a means of communication	5	The parts of computer to learn new information	
	Fun	6		

In view of the analyses concerning the second open ended question, it was detected that 13 of the students described the concept of computer technologies as making research, four of them described it as a means of communication and three of them described it as a means of fun. In control group, seven of the students regard the concept of computer technologies as making research; five of them described it as a means of fun. The question of "Do you

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want to use computer technologies in science and technology courses?" was asked to the both research groups in order to determine the opinions of the students from eight grade about computer technologies in science and technology course. The frequency values concerning the answers given to the open ended question by the students are included in Table 3.

Table 3

The Students' Opinions Regarding the Third Open Ended Question

Do you want to use computer technologies in science and technology course? Why?				
	Codes	f	Sample Expressions	**f**
Experiment group (yes I do:10) Because;	I always like using computer	5	I can learn the subject I wonder faster.	10
	It makes the subject easy for me to understand	5	In order to learn the subjects which are not contained in the course book	
	Doesn't have an idea why they want to use	14	-	
Control Group (Yes I do : 11) Because;	I always like using computer	1	It enables us to understand the subject better when we need to make research about the subjects…	11
	It makes the subject I study easy for me to understand	8		
	Making homework	2	It can make the courses more enjoyable…	

In the view of the analyses concerning the third open ended question, all groups gave the answer "Yes, we do" to the question of "Do you want to use computer technologies in science and technology course?" Fife of the experimental group's students giving the answer "yes" stated that the reason of this was their always enjoying using computer and the other five students of experimental group stated that computer technologies make the subject easy for them to understand; one of students from the control group stated that he always likes using computer; other eight students stated that computer technologies make the subject easy for them to understand and two students mention that it is necessary for doing homework. The question of "How we can use computer technologies in science and technology course?" is asked in order to determine the views of the students from class eight about computer technologies in science and technology course. The frequency values concerning the answers given by the students to the open ended question were given in Table 4.

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Table 4

The Opinions of the Teacher Candidates Concerning the Fourth Open Ended Question

How do you use computer technologies in science and technology course?				
	Codes	f	Sample Expressions	f
Experiment Group	Using educational computer programs	1	That our teacher wants us to make the experiments by using computer and that we do these on the computer… That the internet is used with aim of research in course…	16
	With the purpose of research-communication	8		
	Using as a means of instruction in course	5		
	Searching for picture and video	2		
Control Group	Using educational computer programs	2	Projection system can be used during the course… It can be used while doing the homework… We can find video and picture from the internet…	16
	With the purpose of research-communication	6		
	Searching for picture and video	3		
	Using as a means of instruction in course	5		

With respect to this question, one of the students from experiment group answered it in the way of using educational computer programs, eight of the students in the way of investigation and communication and two of them in the way of searching for pictures and videos. Two students from control group replied this question that computer can be used as a means of educational computer programs, six of them replied that it can be used with the aim of research and communication, three of them replied that it can be used in searching for pictures and videos and five of them replied that it can be used as a means of instruction. The question of "What is your opinion about the use of computer technologies in science and technology course?" was asked to the students to determine the students` opinions about computer technologies in science and technology course.

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Table 5
Students' Views Concerning the Fifth Research Question

What is your opinion about the use of computer technologies in science and technology course?

	Codes	f	Sample Expressions	**f**
Experiment Group	It encourages to make research	6	I think I will remember the things I learn for longer time…	20
	Increasing academic success	5		
	Providing long-lasting learning	4	I have learned how I can make research other than course hours…	
	Increasing the attention to course	5	It affects my success in a positive way	
Control Group	It encourages to make research	2	I can obtain much more information…	18
	Increasing academic success	3		
	Providing long-lasting learning	8	It will be more useful and increase my attention to course…	
	Increasing the attention to course	5	It prevents the course from becoming boring…	

In relation to the fifth open ended question, six students from experiment group said that "It encourages to make research", five of them expressed that "It increases the academic success", four of them mentioned that "It provides long-lasting learning" and five of them said that "it increases academic success", eight of them said "it provides long-lasting learning" and five of them expressed that "It increases the attention to the course".

Conclusion, Results & Suggestions

In accordance with the analyses made in the consequence of the study, five students who want computer technologies to be used within science and technology course have given positive answer because they always like using computer and five students have mentioned that the subject they want to learn can be understood more clearly by using computer technologies. Another question asked to the students was aiming at determining what the computer technologies mean for them. 13 students from experiment group evaluate the concept of computer technologies as research environment, four of them describe as communication environment and three of them have described it as fun environment. The role of the technology in active learning environment was to integrate activities into the lecture so that students have the opportunity to work with concrete examples in class, while the instructor can collect and review student work in real time, incorporating selected student answers into the discussion (Anderson et. Al., 2007). Considering the views of the students

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regarding what aim can be in the use of computer technologies, 16 students of experiment group have said that its aim can be research, seven students have mentioned that its aim can be preparing homework and one student has said that its aim can be having fun. Woodard (2003) also specifically examined the crucial relationship between information literacy, discovery learning, and constructivist pedagogy and discussed the important roles for technology in creating a learning environment for students who are preparing for our information-rich world. When we asked the opinions of the students of the experiment group about the use of computer technologies, (every kind of visual, audio, printed and written means, for instance: computer animations, internet, etc.), six students from experiment group mention that these kind of activities encourage them to make research, five of them denote that it increases their successes in school, four of them say that it provides long lasting learning and five of them mention that it increases their attention to the courses. Finally when the students were asked as to how computer technologies can be more useful during the courses, one student from experiment group says that it can be more useful if they can use educational computer programs, eight of them say it can be more useful if it is used with the aim of research and communication, five students mention that it can be more useful if used as a means of instruction in the course, two students answer that it can be more useful if used as a means of searching for pictures and videos. (Dori and his colleagues, 2003) research result supported this data, they results have shown that problem-solving sessions, two- and three-dimensional visualizations, along with collaborative desktop experiments, web-assignments significantly enhance students' understanding of electromagnetism.

Based on the research findings, the following proposals can be given; some parts of science and technology courses can be performed by having the students make research in computer laboratories and in computer and internet area. In order for the students to better understand the subject matter, computer simulations, instructive programs and information share areas can be increased and developed.

A number of courses, seminars or trainings-in-service can be organized aiming at increasing the skills of Science and Technology teachers in training in the internet environment and also increasing their level of knowledge on this matter.

References

Açıkgöz-Ün, K. (2007) *Aktif öğrenme* [Active Learning] İzmir: Biliş Publication

Aydede, M. N., Kesercioğlu, T. (2008). The Use of Observation Form To Assess Students' Learning Process On Science Laboratory Course. *XIII. International Organization for Science and Technology Education (IOSTE)*. Kesercioğlu, T., Ergin, Ö. (eds). İzmir, Turkey, 934-937

Anderson, R., Anderson, R., Davis, K. M., Linnel, N., Prince C., Razmov, V. (2007). Supporting active learning and example based instruction with classroom technology, *ACM SIGCSE Bulletin, Teaching with tablets and inking technologies, 39(1), 69-73.*

Bahar, M. (2006). *Fen ve teknoloji öğretimi* [Science and Technology Teaching] Bolu: PegemA Publication

Blake, C., Scanlon, E. (2008). Reconsidering simulations in science education at a distance: features of effective use. *Journal of Computer Assisted Learning, 23*, 491-502

Broota , D.K. (1989). *Experimental Design in Behavioural Research*. New Age International

Chang, C.-Y. (2001). Comparing the impacts of a problem-based computer-assisted instruction and the direct-interactive teaching method on student science achievement. *Journal of Science Education and Technology*, 10(2), 147-153

Chou, C. C. (2005). Computer conferencing for technology integration and digital equity. *2005 The National Convention of the Association for Educational Communications and Technology*, (pp. 181-185). Orlando, FL: Eric.

Çepni, S., Taş, E., Köse, S. (2004). The effects of computer-assisted material on students cognitive levels, misconceptions and attitudes towards science. *Computers & Education* 46: 192–205

Dori, Y. J., Belcher, J., Bessette, M., Danziger, M., McKinney, A., Hult, E. (2003), Technology for active learning, *Materials Today*, 6(2), 44-49.

García-Valcárcel, A. and Tejedor, F.J. (2009). Information and communication technologies in University teaching: Implications in European higher education space**.** *International Journal of Human Sciences* [Online]. 6:2. Available: http://www.insanbilimleri.com

Gijbels, D., Watering, G., Dochy, F, Van den Bossche, P. (2006). New learning environments and constructivism: The students' perspective. *Instructional Science. 34* (3), 213-226.

Hermans, R., Tondeur, J., van Braak, J., & Valcke, M. (2008). The Impact of primary School Teachers' Educational Beliefs on The Classroom Use of Computers. *Computers & Education , 51* (4), 1499-1509.

Matthews, M. R. (2002). Constructivism and science education: A further appraisal, *Journal of Science Education and Technology*, 11(2),121-134

Postholm, M. B. (2006). The teacher's role when pupils work on task using ICT in project work, *Educational Research*, 48(2), 155-175

Yenice, N. (2003). Bilgisayar destekli fen bilgisi öğretiminin öğrencilerin fen ve bilgisayar tutumlarına etkisi [The effect of computer assisted science teaching on attitudes of students towards science and computer] *The Turkish Online Journal of Educational Technology*, 2(4)

Woodard, B. S. (2003). Technology and the constructivist learning environment: Implications for teaching information literacy skills, *Research Strategies*, 19, (3-4), 181-192