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Examining Usage Trends of Computer Support of the Prospective Primary School Teachers in the Science Education Based on the 5E Model

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Abstract

The purpose of this study is to examine usage trends of computer support (CS) of Prospective Primary School Teachers (PPST) in science education based on the 5E instruction model. The research was designed according to the case study method. The sample of the study composed of 154 PPST. The PPTS were trained about the 5E model in the science teaching course. Data were collected through open ended questions which are prepared by researchers. These questions were about PPST used CS in their instructions in the 5E but 'why? in which stage of model? and which websites they used?'Data were analyzed with content analysis and their frequencies were calculated. In data analyses, PPST' statements related to their aims about usage of CS such as animations and videos etc. were coded. Results indicated that all of the PPST benefit from the national web sites and they prefer to use animation and videos in 'engage' and 'explanation' stage of the 5E model. Results also showed that PPST will use CS to attract students' attention in the 'engage' stage and explain visually in the 'explanation' stage.

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Keywords: Science teaching, computer supported instruction, the 5E instruction model, prospective primary school teacher;

1. Introduction

The rapid advances in technology have led to the enrichment of technology in educational environments. This situation has led to educators to study on the topics of educational technology, curriculum and teaching methods. Çepni (2009) stated that computer support instructions provide students to learn rapidly and give opportunities to repeat the course contents out of school. Beside these, using computers in classrooms have also effects on students' effective learning to become their learning easier.

In terms of content, the science lesson is appropriate for computer-supported training in ways of like concretization of abstract science concepts, and to make visible the microscopic reasons underlying the observed phenomena with the naked eye (Şahin & Çepni, 2012; Şahin, İpek & Çepni, 2010; Yenice, 2003). The reason for that is the concepts to be learned in science courses do not always learned by direct-teaching or just observing.

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However; the materials, which were prepared in computer like animations, simulations, or videos, can be showed to students and it is provided that students can feel themselves in the situation or case (Okur & Ünal, 2010). Beside this, the inclusion of computer technology in education will support and become easy the inclusion of students to environment of learning (Hırça, Sever & Azar, 2012).

Prenzel, Seidel and Kobarg (2012) stated that, different studies in real classroom settings, as well as in computer-supported learning environments, showed positive impact of real-life applications on students' scientific literacy. Beside this, the materials which are prepared with animations and simulations in computer-supported science teaching will more effective than other methods (Şahin & Çepni, 2012) according to concretization of abstract science concepts by students (Besson & Viennot, 2004; Hırça, Sever, & Azar, 2012; Reid, Zhang & Chen, 2003; Windschitl, 2001; Yılmaz & Saka, 2005), removing misconceptions (Çepni, 2009; Rotbain, Marbach-Ad & Stavy, 2008; Yılmaz & Saka, 2005) and increasing the interest to science courses (Yenice, 2003)

In Turkey, the Science and Technology Education Program that is in accordance with constructivist approach, was developed in 2004 (MEB, 2004). Students' textbooks, workbooks and teachers' guidebooks were prepared according to the 5E instruction model, which consists of the following phases: Engagement, Exploration, Explanation, Elaboration and Evaluation (Bybee, 1997). The 5E instruction model is suitable to become enriched by using different teaching methods and techniques together in every stage of its (Şahin, İpek Akbulut & Çepni, 2012; Kurnaz & Çalık, 2008; Şahin & Çepni, 2012). Computer supported instruction is one of them. We would welcome to study on teacher–students relationships in more computer-supported learning environments. However, it has not been given the necessary importance to the contribution of the teacher about student-peer relationships in computer-supported learning environments; even though, so many studies performed on this subject (Wubbels & Brekelmans, 2012). In today's world, computers used quite often in every kind of profession and it needs to be researched that in which stage of the 5E and why it can be used which is taken as fundamental model in science teaching with computer support. According to this situation, the aim of this study is to examine usage trends of computer support (CS) of Prospective Primary School Teachers (PPST) in science education based on the 5E instruction model.

2. Methodology

The research was designed according to the case study method.

2.1. The Sample

The sample of this study composed of 154 Prospective Primary Science Teachers (PPST) who are 3th grade (junior) in the faculty of education in a university, in Turkey. The PPTS have trained about the 5E instruction model *and computer supported science education* in science teaching course with its examples.

2.2. Data Collection Tool

As a data *collection tool, open* ended questions were *used* which prepared by researchers. *These questions have been presented at below: When you will become a teacher;*

1. *In which stage of the 5E model and for what reasons you take advantage from computers while you teach science?*
2. According to teach science, which science topics or concepts you can take advantage from computer-supported teaching?
3. In which websites can you prefer to take advantage from computer-supported science teaching and which website is much more used?

2.3. Data Analysis

According to qualitative data analysis, the data of this research were analysed with content analysis. PPST' statements related to their aims about the computer supported science education embedded within the 5E instruction model were coded and then their frequencies were calculated.

3. Findings

In this part, the findings of the research are presented respectively. According to the analysis of the data, it is determined that some teachers used 'computer-supported instruction' (CSI) more than one stage. In data, it is found that the 34% of the prospective teachers tend to use CSI in the 'enter' stage (Table 1). Secondly most used CSI is in the stage of the 5E model is 'explanation' with 28%. The 25% of prospective teachers tend to use CSI in 'exploration' stage, 18% is use in 'elaboration' and 12% is use 'evaluation' stage.

Table 1. The frequency table of prospective teachers' usage of the 5E model stages in science teaching with computer-support

Step of the 5Emodel	The Number of the PPST* used CSI (N=154)	%
Enter	53	34
Exploration	39	25
Explanation	43	28
Elaboration	27	18
Evaluation	18	12

*Some prospective teachers expressed that they can use CSI more than one stages of the 5E model

The PPST stated that they can be take advantage from computer-supported instruction (CSI) in the 5E model. Firstly, most of them stated that the 'enter' stage of the 5E model can be used as to take attention (30%), reveal the prior knowledge and motivate; the exploration stage is used to make cognitive construct and interactive experiments, to concretization of abstract concepts; the explanation stage can be used to make concepts more meaningful with the visuals; the elaboration stage can be used to relate with daily life; and the evaluation stage can be used to assess multi-faceted with increasing visually (Table 2).

Table 2. The frequency table of prospective teachers' aim of the 5E model stages

The aims of the 5E model stages	The Number of the PPST* (N=154)	%
Take attention	46	%30
Motivate	8	%5
reveal the prior knowledge	9	%6
make interactive experiments	8	%5
concretization of abstract concepts	12	%8
make concepts more meaningful	27	%18
Meaningful with the visuals	32	%21
relate with daily life	6	%4
Evaluation	13	%9

*Some prospective teachers expressed that they can use CSI more than one aims of the 5E stages.

The results of analysis which analyze the PPSTs' CSI usage trends according to branches stated that almost half of the PPST (48%) prefer 'physics' topics. The most preferred physics topic is 'matter.' Other physics topics are 'electricity, the movement of earth-sun-moon, force, light and sound.' Secondly chosen science branch is biology and the PPST mostly prefer the 'systems of our body' topics. In chemistry, the change of state, resolution and gases topics are preferred. In environment, water cycle and water usage are chosen mostly (Table 3).

Table 3. The frequency table of prospective teachers' usage of computer support according to branches

Branches	The Number of the PPST used CSI (N=154)	%
Physics	72	%48
Biology	55	%36
Chemistry	11	%7
Environment	14	%9

According to the analyses about the preferences of the PPST with respect to usage of websites, all the participants take advantage from national websites. It is determined that 'fenokulu.net' is the most popular most visited website (Table 4).

Table 4. The frequency table of prospective teachers' usage of websites to take advantage from computer support

The web addresses	The Number of the PPST suggested website* (N=154)	The web addresses	The Number of the PPST suggested website* (N=154)
fenokulu.net	128	fenmuzesi.com	3
fenci.gen.tr	32	fencihuseyin.com	2
fendeneyleri.com	30	fenportalı.com	2
fenegitimi.com	27	gencbili.com	2
sanalfen.com	25	krakerim.net	2
fenogretmeniyiz.biz	24	fenrehberim.net	2
fenveteknolojidersi.com	22	fen1.com	2
vitaminegitim.com	21	fenciyim.com	2
fenbilgisi.net	21	fendersi.gen.tr	1
eglencelifen.com	15	morpakampus.net	1
fenciyiz.com	14	Elitsoft	1
fenkurdu.com	11	byfen.com	1
fencebilim.com	8	cebit.com	1
fenciyiz.biz	7	yenisayfa.com.tr	1
dersdoktoru.net	7	ozkaynak.com	1
kimyaokulu.net	6	egitimevi.net	1
genbilim.com	6	fenodevleri.com	1
egitimhane.com	5	fenn.com	1
egitimevi.com	5	fencenneti.com	1
fenogretmeni.com	4	fenci.net	1
fensayfam.com	4	egitimsitemiz.com	1
hayatimizfen.com.tr	4	herseyegitim.com	1
fizikokulu.net	4	fenokur.net	1
fenogretimi.com	3	egitimvakti.com	1
Sınıfõgretmeniyizbiz	3	ucles.org.uk	1
dersizlesene.com	3	yazarlikyazilimi.com	1
pandora.com	3	fenegitimi.org	1
fenogretmeni.com	3	etkinegitim.net	1

* Some PPST suggested more than one website.

4. Discussion

Some of the researches about information technology in education stated that has given not enough attention to the role of the teacher (Ruthven, Hennessey & Brindley, 2004; Urhahne, Schanze, Bell, Mansfield, & Holmes, 2010). Rather, multimedia learning research has focused on knowledge, skills, attitudes and behavior of the learner (Mayer, 2005). It makes contribution to the risk of multimedia learning environments take place of teacher or teacher get used to be just viewer; so, generally just a small part emphasizes the teacher role (Urhahne, et al. 2010).

The awareness of teachers about their role in teaching process and having a good knowledge of pedagogical content are important factors for the quality of education (Bilgin, Tatar & Ay, 2012; Canbazoğlu, Yamak & Kavak, 2012). For that reasons, teachers should have adequate pedagogical content knowledge in order to make a good and qualified computer-supported instruction. Thus, teachers are aware of how and in which situations they can benefit from the computer technology.

The 5E instruction model is used in science and technology program in Turkey. For that reason, teachers needed to encourage that how they will benefit from the computer to the scope of the 5E instructional model. This study can be helpful to the PPST and other teachers about how to use CSI in science teaching based on the 5E instruction model and bring them to different views about science teaching and learning.

According to the expression from the PPST, it can be stated that CSI can be used in every stage of the 5E instruction model. Beside this, the PPST stated how and why CSI can be used in every stage of the 5E model.

The PPST used computers mostly at the ‘enter’ stage of the 5E instruction model for the aim of taking attention. This is interpreted as they had difficulty to prepare activity in the ‘enter’ stage of the 5E instruction model. Başkan, Alev and Atasoy (2007) stated that prospective teachers had difficulty to prepare the activities that they uncover the prior knowledge at the ‘enter’ stage of the 5E instruction model. The prospective teachers in this study may have

benefited from the computer to solve this problem. Although it is identified that teachers and prospective teachers have difficulty in the 'elaboration' stage' according to the literature (Er Nas, Şenel Çoruhlu & Çepni, 2009; Karslı & Şahin, 2009; Sezen, Konur Birinci & Çimer, 2009), it is indicated in this study that the PPST did not tend to use computer support at this stage. This situation can be interpreted as, the PPST did not have difficulty to prepare an activity at 'elaboration' stage or they did not have enough experience in preparing computer-supported activities. Otherwise stated, maybe they don't know how can be used computer-supported activities in the elaboration stage. Training activities can be given to teachers and prospective teachers for to take advantage of the computer-supported instruction as in service and pre service education.

In parallel with these, the PPST were suggested some websites for CSI. In this context, it can be suggested to researchers to study the effectiveness of CSI in every stages of the 5E instruction model in science teaching. It is suggested to the researchers that they can observe teaching practices of the prospective teachers and CSI can be longitudinally researched 'why?' and in 'which stage?' of the 5E instruction model it is used.

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