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The effect of PowerPoint presentations prepared and presented by prospective teachers on biology achievement and attitudes toward biology

Hasan Gürbüz, Mustafa Kışoğlu *, Mehmet Erkol, Ali Alaş, Sakıp Kahraman

*Kazım Karabekir Education Faculty, Atatürk University, Erzurum, 25240, Turkey
#Education Faculty, Aksaray University, Aksaray, 68100, Turkey
Education Faculty, Bayburt University, Bayburt, 69000, Turkey

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Abstract

The study aims to explore the effect of preparing and presenting powerpoint slides on prospective teachers’ biology achievement and attitudes toward biology. The sample of the study was 109 freshman students from Pre-School Education Department at Atatürk University in Turkey. The sample was randomly assigned as control group consisted of 53 students and experimental group consisted of 56 students. The experimental group was taught by powerpoint presentations preparing and presenting by prospective teachers while the lesson was conducted through traditional approach in the control group. Results indicated that preparing and presenting powerpoint slides had a significant effect on prospective teachers biology achievement and attitudes towards biology.

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1. Introduction

The most important aim of science teaching is to provide being learned and used the science concepts which are abstract and hard to learn. But the vast majority of students is not successful in learning science (Leonard, 2000). Therefore, science educators have studied to enhance students’ learning of science concepts for many years. One of these attempts is to use computers in science education. During the late 1970s and early 1980s, the computers began to be used in the college science classroom and this kind of learning came to be called Computer Based Education (CBE) (Halyard and Pridmore, 2000). CBE means using computers in education for all kinds of purposes. This includes both learning process itself and the educational administration (Rahkila, 1996). According to Yalin (2003), CBE is to use computers for teaching a subject or for reinforcing a behaviour shaped before. In Turkey, the computers have been using in education since 1984 (Odabaşi, 1998).
CBE has increased its popularity since the integrating computers into learning environments. Because using computers provides teachers and students some advantages like helping to visualize the concepts, using time effectively, improving complex problem solving and higher order thinking skills (Hopson et al. 2001-2002 ; Muir 1994 ; Odabaş 1998 ; Peck and Dorricott 1994). Studies comparing CBE (include web-based, CD-ROM, simulation e.t.c) and traditional teaching approach revealed that CBE is more effective in increasing the students’ achievement (Morgil et al. 2003 ; Morgil et al. 2004 ; Özdenler and Sayın 2004), attitudes toward CBE (Grossel, 1971) and the lesson (Geban et al., 1992) than traditional teacher-centered approach. Additionally, CBE helps students eliminate their misconceptions about the science concepts (Büyükkasap et al., 1998).

1.1. CBE in Biology Education

Many biological events have complex and dynamic structures. Therefore, the students should have knowledge about structure, process and cause-effect relations in order to define and understand these facts (Yaman, 2005). But, students and prospective teachers have some difficulties in understanding these kinds of complex events and cause-effect relationships in biological facts (Köse and Uşak 2006 ; Nehm and Reilly 2007 ; Temelli 2006). Using computers in biology lessons have a positive effect on understanding complex and dynamic process of biology (Pektaş et al. 2006 ; Riffell and Sibley 2005 ; Soyibo and Hudson 2000 ; Strauss and Kinzie 1994 ; Taşçı and Soran 2008) and on eliminating misconceptions about biological concepts (Köse et al., 2003).

1.2. Using Powerpoint Presentations in the Science Lessons

One of the presentation software programs used in CBE is Microsoft Powerpoint Program that provides to project information directly from a computer onto a screen (Bartsch and Cobern, 2003). The some purposes of using powerpoint presentations are to support lectures by highlighting key points, to stimulate interest by using of clipart and cartoons and to display assignment information (Sammons, 1997). According to studies, powerpoint presentation increases students’ motivation (Marmiené, 2006) and the achievements in the lessons (Akdağ and Tok 2004 ; Aydoğan 2006 ; Mantei 2000). Besides, after the instruction with powerpoint, most of the students stated that powerpoint helped them take notes and study for exam (Noppe, 2007) and they preferred powerpoint lectures to traditional lecture (Frey and Birnbaum, 2002).

Researches that explore the effect of preparing powerpoint presentations by students are very limited. Gunel et al. (2006) compared the effectiveness of writing summary report and preparing powerpoint presentation on students’ achievements about two units in physics lesson. Result indicated that students preparing the powerpoint presentation scored significantly better on achievement test than the summary report format group. In another study, Marmiené (2006) investigated the students’ ability to choose the material and the content of powerpoint presentations on professional topics via the internet and as well as the ability to prepare and deliver the presentation in front of the audience. At the result, it was reported that preparing and delivering powerpoint presentation improved students’ listening, speaking, reading and writing skills.

In the present study, we aimed to explore the effect of powerpoint presentation preparing and presenting by prospective teachers on biology achievement and attitudes toward biology.

2. Methodology

2.1. Participants

The sample of the study was 109 freshman prospective teachers attending the Human Anatomy and Physiology lesson from Pre-School Education Department at Atatürk University in Turkey. The study was conducted in two classes randomly assigned in two groups, one control group (CG) and one experimental group (EG). There were 56 students in EG and 53 students in CG.

2.2. Research Design

A quasi-experimental pre-post test design with control group was used for the study. The EG was taught by powerpoint slides preparing and presenting by prospective teachers while the lesson was conducted through the traditional method in CG.

2.3. Instruments

Two instruments, Biology Attitude Scale (BAS) published previously (Pekel, 2005) and Biology Achievement Test (BAT) developed by researchers, were used to collect data. The BAS contains 15 attitude statements with each
items using a five-point-likert-scale (1=Strongly Disagree, 5=Strongly Agree). The BAT have 31 multiple-choice questions about the Human Anatomy and Physiology. The BAT and the BAS were administered to both groups as pre test and post test. Schematically, research design of the study is presented in Table 1.

2.4. Procedure

The intervention was implemented over 9 weeks period during the first semester of 2008-2009 academic year. The subjects of the lesson were systems in human body consisted of nervous system, endocrine system, motion system, circulation system, respiratory system, digestive system, evacuation system, genital system and sense organs. Before the implementation, it was introduced to the prospective teachers in EG how to prepare a powerpoint presentation during the two weeks. Then, the prospective teachers were divided into nine groups consisted of at least six students. Every group chose a subject to prepare powerpoint presentation. The presentations were limited to 50 slides include table, photograph, graphic and written script. The students were free to use books, articles, magazines and internet during the preparation process of powerpoint presentations. Presentations were delivered to class by the group members in the technology classroom during the lesson duration. The prospective teachers used not only their speaking skills but their communicative skills as well. They asked questions to the audience and discussed the subject with the class. The control group students were taught by traditional teacher-centered approach involving talk and chalk type.

3. Findings

The BAT and the BAS administered to both group as pre-test at the beginning of the study and, the results are presented below.

According to the pre-test scores, there was no difference between EG and CG based on the BAT and the BAS scores at the beginning of the study (p>0.05) (Table 2).

Additionally, pre-test scores of the BAS showed that there was no statistically difference between EG and CG at the beginning of the study (Table 3).

At the end of the study, the BAT and the BAS administered to CG and EG as post-test again. Post-test scores indicated that the prospective teachers in EG scored significantly better on the BAT than the prospective teachers in CG (Table 4).
### Table 4. Prospective teachers’ post-test scores on the BAT

| Group | n  | M    | SD  | p    |
|-------|----|------|-----|------|
| EG    | 56 | 20.21| 4.04| 0.000** |
| CG    | 53 | 15.64| 4.15|      |

**The difference is significant at level 0.001

About the BAS, post-test scores indicated that preparing and presenting powerpoint slides significantly raised the prospective teachers’ attitudes toward biology in EG (Table 5).

### Table 5. Prospective teachers’ post-test scores on the BAS

| Group | n  | M    | SD  | p   |
|-------|----|------|-----|-----|
| EG    | 56 | 3.19 | 0.79| 0.012* |
| CG    | 53 | 2.80 | 0.83|      |

### 4. Discussion

The aim of the study was to investigate the effect of preparing and presenting powerpoint slides about human anatomy and physiology subjects on their biology achievement and attitudes toward biology. Results indicated that presenting and preparing powerpoint slides had a significant effect on prospective teachers’ biology achievement and attitude toward biology. The learners are active in preparing process of the powerpoint slides and use different sources about the subjects. Therefore, they get kinds of information and construct them in their minds. Finally, this construction in mind positively effects conceptual understanding and attitude. These results also supports Mayer’s cognitive theory of multimedia learning. According to Mayer (2001 ; as cited in Bartsch and Cobern, 2003, p.84), people, when learning, will place relevant words into auditory working memory and relevant images into visual working memory. People then organize information separately in auditory and visual memory and finally integrate these representations with prior knowledge.

These results are very meaningful for displaying the advantages of powerpoint presentation prepared by students according to the constructivist manner in increasing the students’ biology learning and attitudes toward biology. Further studies about the other biological subjects are recommended to the researchers in biology education.

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