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THE EFFECT OF THE SCIENCE AND TECHNOLOGY COURSE INTEGRATED WITH CARTOONS ON STUDENTS' ACHIEVEMENT AND ATTITUDES

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Abstract
The purpose of this study is to investigate the effect of science and technology course integrated with cartoons on students' achievement and attitudes. Design of this study is pre-test, post-test experimental design. The sample of this study is 64 seventh grade students (control group=32, experimental group=32) in one of the public elementary school in Isparta. Children's attitude towards the environment and knowledge scale developed by Leeming and Dwyer(1995) was applied to both of the groups before and after application. Paired sample t test results showed all significant difference between pre-test and post-test scores for both experimental and control group with respect to attitude and achievement. When post test scores of experimental and control group were compared, results revealed statistically significant difference between experimental and control group with respect to achievement(p=.00) and attitude(p=.00). As a conclusion, using cartoons in science courses, increases the academic achievement and provides contribution to their attitudes.

Keywords: Cartoon, Enviromental Knowledge, Enviromental Attitude

INTRODUCTION

Nowadays, science teaching has gained importance in order to follow the scientific and technological improvements and to comply with them. Therefore, the constructivist approach was employed in the regulation of the students' schedule in science teaching. Methods and techniques, aiming the students to actively participate in the learning process, were included in the schedule. While these methods and techniques are being applied, visual materials can be said to be one of the materials for permanent and meaningful teaching (Eroglu, 2010). The events in the cartoon, one of the visual materials and a powerful tool in visual approach, with the help of humor including entertaining elements, deals with the situations or persons with critical approach rather than harsh criticism. Cartoons are a kind of an art production, which includes entertainment, humor, satire, thinking and visuality for all ages (Ilikci, 2003).

Education with cartoon has a property of making the most uninterested, the most difficult and least driven student participate in lessons. As it is known that the first steps for providing learning in education are providing interest, attention and motivation, it can be said that concept cartoons should be used for educational activities (Ozalp, 2006).

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In cartoons, even if the message is in a different language it can be understood. Cartoons' critical aspects provide self-criticism and self-judgment for the people who cannot see their own self- created problems especially in units like Environmental Pollution in Science and Technology course. As a result of the judgement, which aims to show the reality, the one who perceives the cartoon can provide his/her own and the other people's attitudes by determining his/her attitudes' negative or positive sides (Ozalp, 2006).
It can be said that science and technology courses in educational schedules, which includes more environmental topics and increased qualifications, has parallels with national and international environmental politics (Alim, 2006). Especially, presenting the Science-Technology-Society-Environment (STSE) relation and the associated attainments and mentioning the educational activities in detail show the importance put on environmental education (MEB, 2005).

Activities and efforts, which are carried out by the people and by all of the livings in order to understand and protect the environment they live in, are called environmental education. One of the fundamental human rights today is to make people gain environmental awareness and to provide a healthy environment for them to live in. A high qualified environmental education is needed for this (Environment Foundation of Turkey, 1993).

Despite the intensive curriculum of the science course that covers environmental topics, the best way to make the students participate in these activities is to assure them to create a relation between the cartoons and their own worlds. Cartoons are often the most entertaining way to practice exercises and scientific applications (Ozalp, 2006). Students have problems in understanding the complicated scientific terms. A topic taught by a teacher can be understood differently by one student. Bridge functioning methods should be practiced between the schemes in a student's mind and scientific terms. Constructivist learning approach is a learning approach in which new instructions are being constructed on the existing schemes. Concept cartoons have the features to practice the constructivist approach principles (Ozalp, 2006).

Since the first day of the human beings' existence, they are affected by the environment as well as affecting the environment with various activities. Within the last 200 years, the improvements in industry, agriculture and medicine emphasize the humans' role in nature. With this evidence there has been a large population growth, and various environmental problems have occurred. Rapid population growth, uncontrolled urbanization, industrialization, air pollutions in cities, pollution in rivers, unconsciousness in distribution and consumption of the freshwater resources, climate difference due to the increase in carbon dioxide gas, ozone layer depletion, the greenhouse effect caused by the gas that spread in the atmosphere, acidic rains, increase in chemical waste covering the sea coast, the tendency of millions of plant and animal species towards extinction, nuclear pollutions, toxic wastes, mercury contaminations and decrease in green areas and increase in desertification are today's nowadays' main environmental problems (Mert, 2006).

The education of Human and Environment topics in concept cartoon involved science and technology courses is proper for solving the universally environmental problems. In this study, with the help of the cartoons students are expected to gain positive environment consciousness. Therefore the purpose of this study is to investigate the effect of science and technology course integrated with cartoons on students' achievement and attitudes.

METHOD

Sample and Design of the Study

Design of this study is pre-test, post-test experimental design. The sample of this study is 64 seventh grade students in one of the public elementary school in Isparta. Control group (n=32) and experimental group (n=32) were randomly determined. Same teacher thought topics in 'Human Being and Environment' unit both for control and experimental group. In both group teacher thought her lesson according to the 5E model of the constructivist approach, in addition to this in experimental group teacher enriched courses with cartoons related to environmental concepts in experimental group. Design of the study is represented in Table 2.1.

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Table 1.1. Design of The Study

Group	Pre-test	Implementation	Post-test
Group 1	Achievement Attitude	Teaching Human Being and Environment' unit with 5E model of the constructivist approach and enriched this courses with cartoons related to environmental concepts	Achievement Attitude
Group 2	Achievement Attitude	Teaching Human Being and Environment' unit with 5E model of the constructivist approach	Achievement Attitude

G1: Experimental Group
G2: Control Group
Achievement: Environmental Knowledge as indicator of Attitude
Attitude: Environmental Attitude

Instrument

Children's attitude towards the environment and knowledge scale (CHEAKS) developed by Leeming and Dwyer (1995) was applied to both of the groups before and after application. CHEAKS was translated and adapted in to Turkish by Alp, Ertepinar, Tekkaya and Yilmaz (2006) and cronbach's alpha coefficient of the was reported as 0.92 in its Turkish version. The knowledge subscale of CHEAKS consisted of 30 multiple-choice items related to six dependent topics namely; animals, energy, recycling, water, pollution, and general issues. The attitude subscale of CHEAKS assessing participants' behavioral intentions toward the environment includes 36 five-point Likert-type items (strongly agree, agree, undecided, disagree, strongly disagree). These attitudinal items are related to subtopics: animals, energy, pollution, recycling, water, and general issues.

RESULTS

Data were analyzed by using SPSS 17 program. Before analyzing the data, all assumptions of the analysis were checked. Independent sample t test was conducted to investigate if there is significant difference between control and experimental groups. Results showed that there was no statistically significant difference between control and experimental groups with respect to attitude (p=.61) and achievement (p=.89) before the application. The results are shown in Table 3.1.

Table 3.1. Independent Samples t-test Results for Pre-test Scores

Variables/Groups	N	Mean	SD	Std.Error	t	P
Achievement						
Experiment	32	12,19	2,96	0,52	0,502	0,617
Control	32	11,84	2,50	0,44		
Attitude						
Experiment	32	134,50	19,96	3,49	-0,133	0,894
Control	32	135,34	29,89	5,28		

* P< 0,05

When post test scores of experimental and control group were compared results revealed statistically significant difference between experimental and control group with respect to achievement (p<.05) and attitude (p<.05).The results are presented in Table 3.2.

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Table 3.2. Independent Samples t-test Results for Post-test Scores

Variables/Groups	N	Mean	SD	Std.Error	t	P
Achievement						
Experiment	32	22,40	3,96	0,70	5,195	0,000*
Control	32	18,06	2,59	0,46		
Attitude						
Experiment	32	160,69	11,23	1,99	2,845	0,006*
Control	32	151,03	15,58	2,75		

* P< 0,05

Paired sample t test was conducted to investigate if there was any significant difference between pre-test and post-test scores for experimental and control groups with respect to attitude and achievement. Results showed all significant difference between pre-test and post-test scores for both experimental and control group with respect to attitude and achievement (p<.05). The results are represented in Table 3.3.

Tablo 3.3. Paired Samples t-test Results for Groups related to Achievement and Attitude Scores

Variables/Groups	N	Mean	SD	Std.Error	t	P
Experiment						
Achievement pre-	32	12,19	2,96	0,70	0,751	0,000*
Achievement post	32	22,40	3,96	0,46		
Attitude pre-	32	134,50	19,77	3,50	0,789	0,000*
Attitude post	32	160,69	11,23	1,99		
Control						
Achievement pre-	32	11,84	2,50	0,44	0,663	0,000*
Achievement post	32	18,06	2,59	0,46		
Attitude pre-	32	135,34	29,89	5,28	0,862	0,000*
Attitude post	32	151,03	15,58	2,75		

* P< 0,05

CONCLUSION AND DISCUSSION

Before starting the application, we can say that the level of the students in environmental achievement and attitude is the same. Table 3.1 presents that the control and experimental groups are equal in terms of pre-test success and attitude scores.

At the end of the application a significant difference was found between post-test success and attitude scores in control and experimental groups. According to this result, in terms of post-test scores, we can say that cartoon enriched education is more effective due to the experimental groups higher results in aimed attainment than the control group. The result of the study shows parallelism with the study results made by (Balım, Inel and Everekli, 2008; Dereli, 2008; Durmaz, 2007; Kabapınar, 2005). In addition, Table 3.2 shows that, compared to the control group, experimental group's attitude towards environment is much higher. The result we have found in this study contradicts with some study results like Ozalp (2006) and Baysarı (2007). Ozalp (2006) couldn't find a significant difference between the studies in environmental attitudes in his study.

We can say that compared to with the pre-test success scores; students in the experimental group are more successful in with post-test success scores. We can also say that the students sufficiently reached the aimed attainments. The result obtained from this study shows consistency with Ozuredi (2009) and Eroglu's (2010) study results. On the basis of these results, we can say that concept cartoons are effective in increasing the students' success in education. The post-test success scores of the control group students, compared with their

pre-test scores are higher. We can demonstrate that the education which is performed in accordance with the instruction of the books, which are approved by the Ministry of Education, help to reach the aimed attainment. Both of the groups had success when looking at their average success, but the experimental group's success is much higher. In addition to this, compared with the post-test attitude results, experimental group's scores are higher in post-test attitude scores, which mean that the students acquired a positive attitude towards environment. We can also say that compared with the post-test attitude results, control group's scores are higher in post-test attitude scores and students acquired a positive attitude towards environment. When looking at the average attitude of the groups, both of the groups achieved positive increase, but the attitude increase in experimental group is much higher. Attitude consists of three components. These are cognitive, affective and behavioral components. Cognitive component is individual's constituted knowledge towards object, affective component is the feeling towards an object and behavioral component is individual's behavior according to his/her feelings and notion (Gelbal, 2005). Students' knowledge levels in environmental issues increased in relation to the results of fifth and sixth sub-problems. So, we can say that both the control and experimental group students gained a positive attitude towards the environment with the increase of cognitive component and other components. As a conclusion, using cartoons in science courses, increases the academic achievement and provides contribution to their attitudes.

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