



The Investigation of Influence of Visual Approach on University Students' Academic Achievement in Physics Courses

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Abstract

In this study, it was investigated the effect of the visual reading approach carried out in physics course on university students' academic achievements, understanding and their attitudes towards physics course. The study was based on pretest-post test experimental design with control group. The lessons were taught to experimental group by using the visual reading method and to control group by using traditional method.

The data were analyzed by using SPSS statistical program. The findings indicated that the using of visual reading approach affected more positively the students' academic achievements in physics course, understanding and their attitudes towards physics course than traditional method.

The study was carried out 2012-2013 semester. The subjects of the present study consisted of 80 undergraduate students (13 boys and 67 girls) from two mathematic classes taught by the same teacher at university in Turkey. Students' ages are ranged from 19 to 20 years.

1. Introduction

Visual literacy in the modern world has become an important part of general education. The environment in which individuals live on the streets of the television images from the computer to show up multivision visual elements used in communications is under intense clamp. In addition this density also causes a quick visual change. To be successful in this process, only the icons printed on paper is seen as the ability to shed traditional literacy skills are inadequate [1]. According to Petterson [2] visual literacy, "remarkable abilities, knowledge, and behaviors can be learned and taught, and that reflect different visual forms is a concept that we can improve our communication skills". Visual literacy, knowledge of basic visual concepts, image, images to understand the meaning and adds the ability to use. According to Heinich et al [3], visual literacy is defined as visual messages signification and create a message of strength.

Moreno and Mayer (2000) suggested that facilitates learning "visual and verbal memory became interested in how they affect each other, visuals and words, people meaningful ways to select information, to organize and unify the organization for help [4].

A study made by Duzgun [5] entitled "The importance of visual teaching materials on comprehension of topics in physics" The use of visual materials and visual reading of the students' understanding, comprehension and academic achievement is stated that contribute significantly. Again, a study made by Duzgun and his friends [6] are highlighted in another study in the same issue.

A study made by Ünal [7], entitled "Photos of textbook analysis" in his research for the master's thesis emphasized that various pictures and graphics visualizing concepts in the text allows the text easier to understand. "

Stokes [8], emphasized the enriched with visual components work has been done on the impact of teaching and education in the use of visual tools that have a positive impact on the success.

Akçam [1] noted in his study, visual reading informational texts making positive effects on levels of meaning making, finding the main idea, making inferences, and summarizing skills. Akçam [1] emphasized his master's thesis; students with visual reading skills have more reading comprehension, critical reading skills and academic success.



2. Method

2.1 Purpose

In this study, we investigated the effects of visual reading approach on university (undergraduate) students' academic achievement in physics classes. The investigation related to importance of visual literacy on university education never seen in a study in our country. So, researchers working in this area have decided to make.

2.2 Subjects of the study

In this study, the experimental-control group and pre-test-post-test model was applied. This study was conducted over a four-week period. A total of 80 students from two physics classes were involved in the study. The classroom instruction for both groups was given by the same teacher. One class was assigned as the experimental group and the other as the control group. The experimental group was instructed using visual reading activities. The control group received traditional physics instruction.

2.3 Instruments

2.3.1 Linear Motion Subject Tests

Test was developed by the researchers. The test contained 10 multiple-choice questions was applied the groups before and after treatments. Each question had one correct answer and four distracters. The purpose of the test was to measure students' understanding of projectile motion concepts, all items in the test were conceptual, and no quantitative calculations were needed to answer questions. The reliability (alpha) of the test was found to be 0.79, which is considerably high for a test.

2.3.2 Physics Attitude Scale (PAS)

The purpose of this scale, which was developed by the researchers, was to measure students' attitudes toward physics as a school subject. This instrument contains 34 items in a five-point Likert-type scale (fully agree, agree, undecided, partially disagree, and fully disagree). The reliability was found as 0.88.

2.4 Treatment

This study was conducted over a four-week period. A total of 80 students from two physics classes were involved in the study. The classroom instruction for both groups was given by the same teacher. The classroom instruction for both groups involved four 50-minute periods per week. The same topics related to liner motion concepts were covered for both the experimental and control groups. The control group received traditional instruction which involved lessons using lecture/discussion methods to teach concepts. The teacher described and defined the concepts and after explanation, some concepts were discussed, motivated by teacher-directed questions.

In the experimental group, the visual reading approach was used. This approach includes visual questions, pictures, simulations related to linear motion concepts.

3. Results

In this study, the independent group *t*-test was used in order to investigate the effect of treatment on the dependent variables. The dependent variables were students' attitudes towards physics (PAS) and their visualization concept achievement.

Independent group *t*-test results for pre- test scores of concept test.

Group	n	\bar{X}	Standard deviation	Standard error	t	p
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experimental	40	43.25	23.5761	3.7277	-0.245	0.807 [p>0.05]
control	40	44.50	22.0663	3.4890		

As shown in Table 3, it was found that there was no significant difference between the experimental and the control group in terms of achievement at the pretest scores ($p > 0.05$, $t = -0.245$). It means there were no differences between the control and experimental group in terms of knowledge about the topic at the beginning.

Independent group t-test results for post-test scores of concept test.

group	n	\bar{X}	Standart deviation	Standard error	t	p
experimental	40	70.00	19.6116	3.1009	3.227	0.002 [p<0.01]
control	40	56.50	17.7663	2.8091		

As seen at table 4, after treatment arithmetic average of the experimental group and standard deviation were found 70 and 19.61 respectively. Similarly, after treatment arithmetic average of the control group and standard deviation was found 56.50 and 17.76 respectively. According to post test results, there were statistical difference between experimental and control group at 0.01 meaningful level.

Independent group t-test results for pre and post-test results of attitude test

	Group	N	\bar{X}	Standart deviation	Standard error	t	p
Pre-test	experimental	40	22	0.8534	0.1349	0.548	0.585 [p>0.05]
	control	40	21	0.7790	0.1230		
Post-test	experimental	40	31.5	0.9753	0.1542	1.829	0.071 [p>0.05]
	control	40	27.5	0.9806	0.1550		

On the other hand, t-test analysis showed that there was no significant difference between the mean scores of the experimental group and the control group with respect to their attitudes towards physic ($t = 0.548$, $p > 0.05$). After treatment, independent group t-test analyses showed that there was no significant difference between the mean scores of the experimental group and the control group with respect to their attitudes towards physic ($t = 1.829$, $p > 0.05$). As seen in table the post attitude test arithmetic average of the experimental group was found 31.5 and was found 27.5 of the control group. According to arithmetic average, visual reading approach more effected than traditional approach on students' attitude towards physics. When dependent group t-test analyzed, the pre and post-test results of the experimental groups' attitude test, there was a statistical difference between pre and post test results.

When analyzed the dependent group t-test results, there is a significant difference between pre and post test results of experimental group. According to these results, visual reading approach have positive effects on students' linear motion topic.

Dependent group t-test results showed that there is a significant difference between pre and post test results of the experimental group. This results showed that the students teaching with visual reading



approach have positive effects more than control group students' teaching with traditional instruction ($t=-5.663$, $p<0.001$).

4. Conclusion

The results of the study revealed that the visual reading approach have a positive effects on students understanding of linear motion concepts and on students attitude towards physics. This approach can be used others area of the physics.

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