The Effect Of Web Based Learning Method In Science Education On Improving The Students' Scientific Process Skills[1]

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Abstract

In this study, in which the effect of web based learning method on students' scientific process skills was studied, an experimental group and a control group were formed students, studying a public primary school's 8th grades in Bahcelievler district of Istanbul.
In the material which developed by the researchers, it was aimed to enable students to learn acid-base subject by using interactive animations and simulations.
In order to collect data, a scale consisting of 31 questions was adapted by Koray (2003) and the KR-21 reliability coefficent of which is .81.To determine whether there is a significant correlation between achievement tests of the experimental group, and those of the control group or not, t-test was used.
As a result of the study, it was found that there wasn't a significant difference between the students' scientific process skills pre-test scores and post-test scores in both groups. When the correlation between the scientific process skills post-test scores of the experimental group, and those of the control group were measured, it was found that the post-test scores of the students in the experimental group were higher than the post-test scores of the students in the control group. The difference was statistically significant. According to these results, recommendations were suggested about the effect of web based learning method on improving the students' scientific process skills regarding science subjects.

1. Introduction

The primary classes are complex social environment in which children talk to each other, write, learn and interact with one another. While meeting our needs, we observe physical and social world that we interact scientifically, make guesses and explanation, question, make plan, hypothesize, communicate and make comments. These actions are process skills of science [1].
According to Lind (1998), scientific process skills are thinking abilities that we use in creating knowledge, thinking about problems and formulating the results [2].
Martin et al. (2002) discuss scientific process skills in two groups which are basic and integrated scientific process skills. Observation, measurement, classification, prediction and communication skills constitute basic scientific process skills. Meanwhile integrated scientific process skills contain skills of identifying and controlling variables, developing and testing hypothesis, data interpretation, defining operationally, making experiment and setting a model [3].
Scientific process skills are basic abilities that facilitate learning in science, allow students to become more active and responsible for their own learning, increase persistence of learning, help develop ways of inquiry [4].
The main purpose of science education can be defined as providing students to acquire science concepts and science process skills [5].
In building skills targeted by today's education world, Web-based technologies extensively help accessing unlimited resources; communicating within a wide range of people, developing materials which are required to design collaborative work environments; and solving the utilized problem scenarios easily in problem based environments.

[1] This study constitutes a part of Beyza Karadeniz Bayrak doctoral dissertation which is written under the supervision of Prof.Dr. Hale Bayram.

2. Method

In this study web based learning method's effect on students' scientific process skills towards science and technology course is investigated. With the help of the material developed by the researcher, it is aimed to enable students learn acid-base subject by interactive animations and simulations. In the program, students who work cooperatively had the possibility to interact with group friends, share information, and solve problems.
This program was specially designed based on the Harper-Marinick (2001) Model [6].
This model consisted of the following sequences of learning:

- Introductory Information
- Presentation of an ill-structured and real-world problem
- Online collaboration
- Online resources
- Follow-up online collaboration
- Solution to the problem

In the research, an experimental study that fits the pre-test post-test model is conducted.

2.1 Study Group

The study group of the research consists of 28 students who are enrolled in a public primary school's 8th grades in Bahcelievler district of Istanbul.

2.2 Data Collection Instruments

In order to collect data, a scale consisting of 31 questions was developed by Enger ve Yager (1998) [7] adapted by Koray (2003) [8]. For the reliability of the scale, KR Reliablity Analysis was done, as a result of the analysis, 0.81 was found KR reliability coefficient of the test.

2.3 Data Analysis

To determine whether there is a significant correlation between scientific process skills tests of the Experiment Group and of the Control Group or not, independent samples t-test and paired samples t-test analysis were used.

3. Findings and Comment

T-test results of pre-test scientific process skills scores according to control- experiment groups are presented as in Table 1.

Table 1. t-test results of pre-test scientific process skills scores according to control- experiment groups

	N	X	s	sd	t	p
Control	28	14,00	4,80	54	0,711	,480
Experiment		14,96	5,32			

t_{54}= ,711 p> ,05 *p> ,05 shows that the difference is not statistically significant.

Table 1 reveals that there isn't a significant difference between the control and experiment groups regarding students' scientific process skills towards pre-test.

t-test results of post-test scientific process skills scores according to control- experiment groups are presented as in Table 2.

Table 2. t-test results of post-test scientific process skills scores according to control- experiment groups

	N	X	s	sd	t	p
Control	28	12,89	5,13	54	2,121	,038
Experiment		15,82	5,19			

t_{54}= 2,121 p< ,05 *p<,05 shows that the difference is statistically significant

Table 2 reveals that there is a significant difference between the control and experiment groups regarding students' scientific process skills towards post-test.

To determine whether there is a significant correlation between scientific process skills tests of the Control Group or not paired samples t-test analysis was used.

t-test results of pre-post scientific process skills scores according to control group are presented as in Table 3.

Table 3. t-test results of pre-post scientific process skills scores according to control group

	N	X	s	sd	t	p
Pre- test	28	14,00	4,80	27	1,272	,214
Post-test		12,89	5,13			

t_{27}= 1,272 p> ,05 *p>,05 shows that the difference is not statistically significant.

Table 3 reveals that there isn't a significant difference between the pre-test and post-test points regarding students' scientific process skills towards control group.

To determine whether there is a significant correlation between scientific process skills tests of the Experiment Group or not paired samples t-test analysis was used.

t-test results of pre-post scientific process skills scores according to experiment group are presented as in Table 4.

Table 4. t-test

	N	X	s	sd	t	p
Pre- test	28	14,96	5,32	27	, 895	,379
Post- test		15,82	5,19			

results of pre-post scientific process skills scores according to experiment group

t_{27}= ,895 p> ,05 *p>,05 shows that the difference is not statistically significant.

Table 4 reveals that there isn't a significant difference between the pre-test and post-test points regarding students' scientific process skills towards experiment group.

4. Result, Discussion, and Suggestion

In this study, it was aimed to investigate the effect of web based learning method on students' scientific process skills science and technology class in primary schools' 8th grades.
The study investigates effectiveness of web based learning on students' scientific process skills science and technology course by teaching acid-base subject with simulation and animation aided teaching material in computer environment.
In order to identify the effect of method, following the treatment, a scientific process skills test was employed among all students who were in experimental and control groups.
There hasn't been a significant difference between the pre-test and post-test scientific process skills scale scores of experiment and control groups. There exists no significant difference between the pre-test post-test average scientific process skills scores.
The control groups' post-test average was (X =12,89) and the experiment groups' scientific process skills post-test average was (X =15,82).
Data analysis results indicate that post test mean score of experimental group is higher than post test mean score of control group, and this mean difference is statistically significant ($t(54)= 2,121$; $p< .05$). This result may be interpreted as Web-based instruction considering student centered collaborative learning environment contributes more on enhancing scientific process skills compared to traditional approach.
In the literature, there are several researches indicating that Web-based instruction enhances scientific process skills; students communicate more with each other in collaborative learning environments and therefore gain upper level skills [9,10,11,12].
In future studies, the effect of new arrangements and different application types on student and teacher education may be investigated.
Different applications may be utilized to enhance scientific process skills, and applications including different thinking skills may be developed and results may be compared.

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