

The Study of Science Concepts and Science Attitude for Science Camps in Taipei Elementary Schools

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Abstract

The purpose of the study is to analyze the effects of science concepts and science attitude through science camps in two elementary schools of Taipei City. One is an urban school and another one is a suburban school.

The one group pretest-posttest design will be conducted in the study. Two groups are designed in urban and suburban areas. Each sample school included one class for science camp activities. One 6th grade class was suburban school of 22 males and 8 females (30 total students). And other 6th grade class was urban school of 19 males and 15 female (34 total students). All four activities were water rocket, environmental soap, rollback can, and solar cart. There were 4 weeks spent in the camp activities. Pretest and posttest were conducted before and after science camp. There are 20 questions included in the assessment test. The total score of the test is 80 points i.e. 4 points for each question. The reliability of the test is .85. There were some outcomes are bellow:

There is a significant statistical difference between the two schools in both science concepts and science attitude. ($F=36.605$, $p=.000$, $p<.001$ for science concepts, $F=17.484$, $p=.000$, $p<.001$ for science attitude).

There is a significant statistical difference between pretest and posttest in science concepts. ($F=53.551$, $p=.000$, $p<.001$); But there is no significant statistical difference between pretest and posttest in science attitude. ($F=2.608$, $p=.109$, $p>.05$)

And there is no significant difference between males and females in both science concepts and science attitude. ($F=.676$, $p=.413$, $p>.05$, for science concepts; $F=2.535$, $p=.114$, $p>.05$, for science attitude).

The researcher suggests that elementary science teachers should teach their students by using exploration activities. Also the researcher suggests that the head of the education bureau would focus on the exploration activities into science courses. The head of Taipei City Education Bureau should put more concern the gaps between urban and suburban area schools and set more exploration activities in suburban area schools.

The statistical outcomes ANCOVA (Analysis of Covariance) will be shown in the study.

Key words: Exploration Activities, Science Camp, One-group pretest-posttest designed, Analysis of Covariance.

Introduction

The main goal of this study was to analyze the effects of science concepts and science attitude through science camps in two elementary schools of Taipei City. One is an urban school and another one is a suburban school. All activities are related to science exploration theory and Bruner's discovery theory.

The researcher conducted one group pretest-posttest design. Two schools were selected as samples of the study. Each 6th grade class was selected from each school. The pilot study was conducted in other school in Taipei City. The four activities included water rocket, environment soap, rollback can, and solar cart are designed by the researcher. The period of the science camp is four weeks. The 20 multiple choice assessment instrument was designed after modifying instrument. Pretest and posttest were set before and after Science Camps. The reliability of assessment instrument is .85. One science educators and two elementary school teachers were invited to review the instrument and help to modify the test items. For example, the 20 questions were selected from the original 35 questions according to item discrimination and difficulty.

Review of Literature

The science camp is founded on the exploration of Bruner theory. All activities can help students to understand the new concepts, thus, increasing students' interesting(Gegorio, 2005). All activities are designed under ideas of National Science Council's project.

The four activities of the study were water rocket, environmental soap, rollback can, and solar cart.

Water rocket: Students set up the water rocket step by step under the operation procedures. The students can learn the science concepts and get better science attitude while the activities(Kamishina). They can get concepts of action and reaction law.

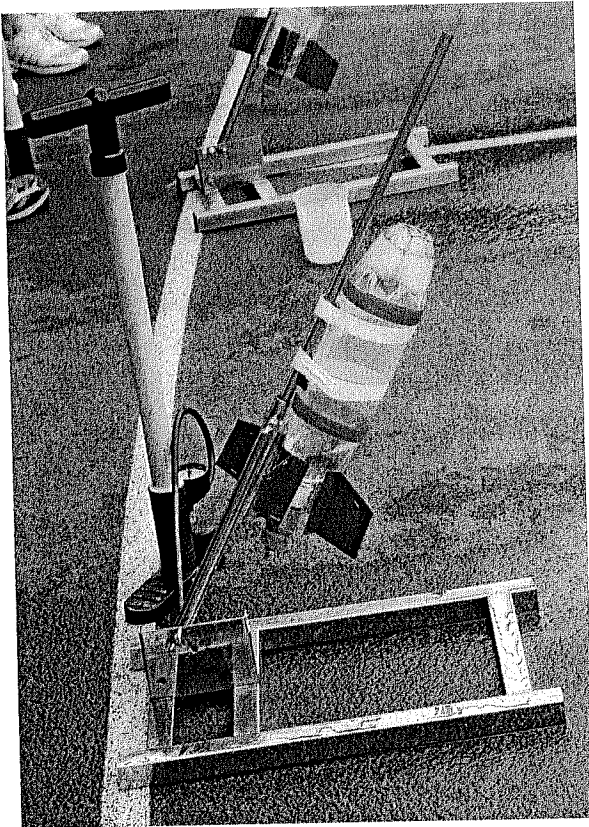


Figure 1. The demonstration of Water Rocket

Environment soap: Students set up and make environmental soap under soap-making procedures. The students learn the environment protection concepts and get better science attitude of environment soap activity.

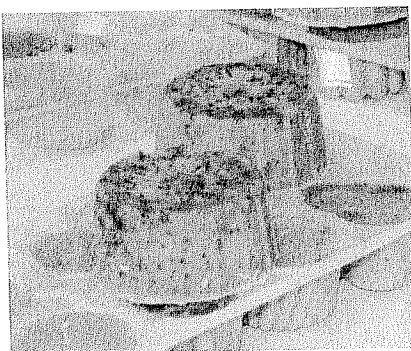


Figure 2. The demonstration of Environmental Soap

Rollback can: Students set up the rollback can from materials which are provided by the researcher. Each student must make one rollback can. Students must learn how to generate the

maximum distance and then roll back as possible as his/her can. They can learn the concepts of conservation of energy also they can find the phenomena of rollback of the equipment.

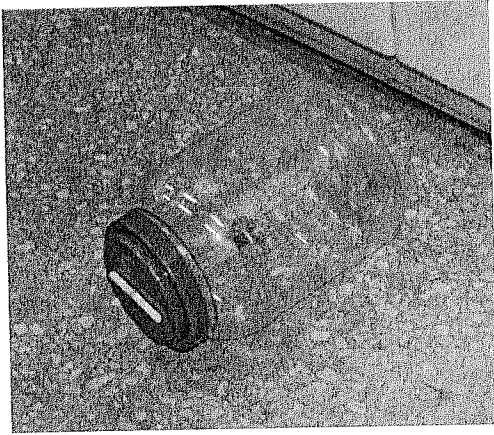


Figure 3. The demonstration of Rollback Can

Solar Cart: Students set up the solar cart under the instruction rules. The students learn science concepts and knowledge through operating exploration activities. They can get concepts of the transformation of solar energy into electricity and kinetic energy.

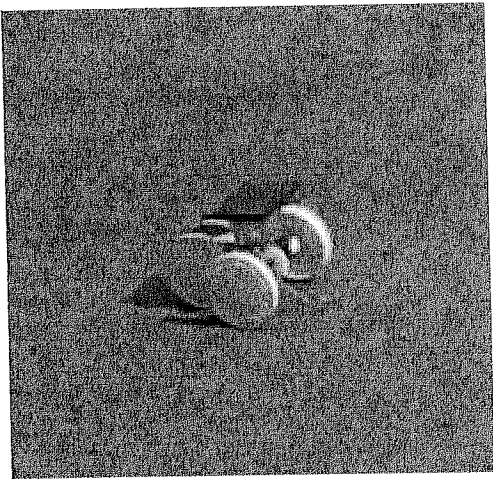


Figure 4. The demonstration of Solar Cart

Methodology

This study was conducted by using a one group pretest-posttest design. The sample groups were selected from one sixth grade class from each elementary school of sample schools in Taipei City. One class was sub-urban school of 22 males and 8 females (30 total students) and the other was urban school consisting of 19 males and 15 females (34 total students). All four activities were water rocket, environmental soap, rollback can, and solar cart. There were 4 weeks spent in the camp. The assessment instrument was a 20-multiple choice test designed by the researcher. Each of the 20 questions are worth 4 points for a total score of 80 points for the instrument. The reliability of the assessment instrument is .85. The assessment instrument was given to the students prior to the activities (pretest) and then after the activities (posttest). All outcomes of the data from the camp were discussed.

Outcomes and Results

According to the Analysis of Covariance of the data from this study, there are three outcomes found. 1). There is a significant difference between two schools in both science concepts and science attitude; 2). There is no significant difference between males and females in both science concepts and science attitude. 3). There is a significant difference between pretest and posttest results in science concept but there is no significant difference between pretest and posttest in science attitude. All statistics results as from Table 1 to Table 2.

Table 1.

Analysis of Covariance (ANCOVA) for science concepts

Source	Adjusted SS	df	MS	F	p
Adjusted	11384.082 ^a	7	1626.297	15.384	.000
School	3869.727	1	3869.727	36.605	.000***
Pre-posttest	5661.102	1	5661.102	53.551	.000***
Gender	71.437	1	71.437	.676	.413
School * Pre-posttest	295.908	1	295.908	2.799	.097
School * Gender	176.424	1	176.424	1.669	.199
Pre-posttest * Gender	15.636	1	15.636	.148	.701
School * Pre-posttest * Gender	46.152	1	46.152	.437	.510
Error	12685.793	120	105.715		
Total	373936.000	128			
Adjusted Total	24069.875	127			

***p<.001

Table 2.

Analysis of Covariance (ANCOVA) for science attitude

Source	Adjusted SS	df	MS	F	p
Adjusted	9545.424 ^a	7	1363.632	4.758	.000
School	5011.172	1	5011.172	17.484	.000***
Pre-posttest	747.544	1	747.544	2.608	.109
Gender	726.539	1	726.539	2.535	.114
School * Pre-posttest	341.299	1	341.299	1.191	.277
School * Gender	616.761	1	616.761	2.152	.145
Pre-posttest * Gender	152.375	1	152.375	.532	.467
School * Pre-posttest * Gender	29.675	1	29.675	.104	.748
Error	34394.255	120	286.619		
Total	2731371.000	128			
Adjusted Total	43939.680	127			

***p<.001

There is a significant statistical difference between the two schools in both science concepts and science attitude. ($F=36.605$, $p=.000$, $p<.001$ for science concepts, $F=17.484$, $p=.000$, $p<.001$ for science attitude).

There is a significant statistical difference between pretest and posttest in science concepts. ($F=53.551$, $p=.000$, $p<.001$); But there is no significant statistical difference between pretest and posttest in science attitude. ($F=2.608$, $p=.109$, $p>.05$)

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Conclusions and Suggestions

The researcher summarized the conclusions and suggestions based on the outcomes and results of the research.

The conclusions are summarized below:

1. The exploration activities of urban area school are more efficient than suburban area school in sixth grade on both science concepts and science attitude.
2. There were no significant differences between males and females on both science concepts and science attitude.
3. There is a significant difference between pretest and posttest in science concepts, but there is no significant difference between pretest and posttest in science attitude.

The researcher suggests that elementary science teachers should teach their students by using exploration activities. Also the researcher suggests that the head of Taipei City Education Bureau would focus on the exploration activities into science courses. The head of Taipei City Education Bureau should put more concern the gaps between urban and suburban area schools and set more exploration activities in suburban area schools.

References

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