

EMBARKING GUIDED DISCOVERY LEARNING FOR HIGH SCHOOL SCIENCE STUDENTS ON ACHIEVEMENT IN PHYSICS

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Abstract

Science has been man's greatest friend since the dawn of civilization. Educationists, psychologists and philosophers have tried their best to develop new strategies, approaches and methods to make science education more effective. The difficult to teach and challenging to learn scientific concepts is attributed by the fact that Science has always been associated with demonstrations, experiments, analysis and inductive-deductive reasoning. So, innovative science teaching strategies must come out in order to satisfy the varied needs of the students. Guided discovery learning combines guiding the way to understanding or problem-solving by a facilitator along with the discovery of facts, drawing relationships and proposing solutions by the students themselves, as they explore things, manipulate, debate, or perform experiments inculcating upon their own experience and existing knowledge.

Keywords: Guided Discovery Learning, Scientific literacy.

INTRODUCTION

The strong pillar of Guided Discovery Learning is that students utilize their prior knowledge, current knowledge, and new knowledge acquired, to discover new concepts, truths, or beliefs about a topic with the guidance of a facilitator. With Guided Discovery Learning, students are able to gain new knowledge utilizing their cognitive ability. In Guided Discovery learning, teachers or facilitators can give the students a set of questions about a subject topic and the students work as sole or in a group to discover the facts and discover connections between them in order to comprehend the concepts hidden in the questions asked. It is imperative that with Guided Discovery Learning the teachers take a prime role in ensuring that the learning process of students are going in the right direction. Also teachers must proactively inspect if students are drawing delusions about the topic and then correct the misconceptions thereby the learning is complete without any ambiguity. Guided Discovery Learning is a process in which the students receive problems to solve, but the teacher provides hints and directions about how to solve the problem, to keep the student on track (Mayer, 2003).

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Achievement is the product of all the educational endeavors. Monitoring the achievement in learning understands, assessing the knowledge, skills, and attitudes/attributes and values, the pupils have gained. However, so many people are interested to know the outcomes of learning. For every kind of stakeholder, the concern may be different. Students may want to know if they are learning, and if so, how well.

The statement of the problem is Guided Discovery Learning for high school Science students on Achievement in Physics. The objectives of our study are: 1) To find whether there is significant difference in the means of scores of pre-test and post-test on Achievement in Physics of the Experimental Group. 2) To find whether there is significant difference in the means of scores of pre-test and post-test on Achievement in Physics of the Control Group.

HYPOTHESES OF THE STUDY

1. There exists a significant difference between the means of scores of Pre-test and Post-test scores on Achievement in Physics of the Experimental group.
2. There exists a significant difference between the means of scores of Pre-test and Post-test scores on Achievement in Physics of the Control group.

METHODOLOGY IN BRIEF

Tools Used:

Research tools are instruments used for collecting evidences or data for the project or study. In the present study the investigator used the following tools.

Facilitative tools:

- Lesson transcripts based on Guided Discovery Learning Method
- Lesson transcripts based on the Existing Method prepared by the investigator

Evaluative tools:

Achievement Test in Physics of Unit Force on Eighth standard students prepared by the investigator.

Population and Sample of the Study:

The population for the present data covers all students of standard Eight of Kottayam district following Kerala state syllabus. Sampling is the process of selecting a sample from a population. The investigator used cluster sampling method to select the school. From this

school investigator selected two classes randomly as Experimental and Control group. The sample of the study was divided into two groups each of with Thirty-five students.

Procedure for Data Collection:

The investigator did the present study with the following phases:

Phase 1: Administration of Pre-test: The investigator conducted a pre- test in both Experimental and Control groups.

Phase 2: Treatment: The investigator provided the Experimental group instructional material based on Guided Discovery Learning method and teach the control group through Existing teaching materials.

Phase 3: Administration of post-test: Here administrator administered the post test on Achievement test in physics to both the Experimental and Control group, by the same test used for pre-testing.

Phase 4: Analysis: Answer sheet will be analyzed according to the scoring key and the data is analyzed using statistical measures.

Statistical Techniques Employed and Data Collection:

The investigator used SPSS statistical package for the statistical analysis and calculations of the obtained data. The investigator used the t-test (Test of significance difference between means for large independent group to compare pre and post test scores in inferential statistics) between two independent groups to analyze these objectives. The investigator selected two divisions of Standard Eight of St. Joseph's H.S.S Vilakkumadam for the Experimental study. Then randomly selected two groups and assigned one group as Experimental and the other group is Control group.

Variables of the Study:

Variables are conditions or characteristics that the experimenter manipulates, controls, or observes (Best & Khan, 2003). In order to meet the objectives of the study, the investigator selected the following variables namely Independent and Dependent Variables.

- Independent Variables: In the present study the investigator selected independent variables called treatment variables. The treatment was based on eight lesson plans using Guided Discovery Learning as a learning tool to the Experimental group and instruction based on the Existing Method to the Control group.

- **Dependent Variables:** The dependent variables are the conditions or characteristics that appear, disappear, or change during the experiment (Best, 1980). The dependent variables are the measured changes in pupil's performance attributable to the influence of the independent variable. In this study the investigator selected Achievement in Physics as the dependent variable.

ANALYSIS OF THE DATA

Difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of Experimental group

The first objective was to find out whether there is significant difference in the means of Scores of pre-test and post-test on Achievement in Physics of Experimental group. For this the investigator formulated research hypothesis which states that "There exists a significant difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of the Experimental group".

The investigator formulated the null hypothesis in order to test the research hypothesis. The null hypothesis is stated below;

H_0 : "There exists no significant difference in the means of Scores of Pre-test and Post-test on Achievement in Physics of the Experimental group".

Table 1. *Test of Significance of the Difference between the Means of Scores of Pre-test and Post-test of Experimental group*

Scores	N	Maximum Scores	Mean	Standard Deviation	t value	Df	P Value
Pre-test		40	13.94	2.91			
Post-test	35	40	27.91	3.17	24.628	34	< .001*

* Significant at .05 level

The investigator administered Pre-test and Post-test for Experimental group and thus obtained the data needed for testing the null hypothesis. The difference in the Scores on Pre-test and Post-test was found out. The investigator tested the hypothesis using the test of significance difference between the Means of two correlated groups. The level of significance was fixed at

.05 level for degrees of freedom 34. The detailed description of analysis is presented in the table 1

From the table 1 the investigator observed that the Means of the Pre-test and Post-test Scores of the Experimental group on Achievement in Physics are 13.94 and 27.91 and Standard Deviations 2.91 and 3.17 respectively. The calculated 't' value is 24.628 which is more than 2.00 at 0.05 levels of significance. Therefore, the null hypothesis "There exists no significant difference in the Means of Scores of Pre-test and Post-test scores on Achievement in Physics of Experimental group" is not accepted and hence the research hypothesis is accepted. The investigator found that there is a significant difference between Pre-test Scores and Post-test Scores of the Experimental group on Achievement in Physics at 0.05 level of significance.

From the above results the investigator concluded that there exists a significant difference between the Means of the Pre-test and Post-test Scores on Achievement in Physics of Experimental group. It is observed that the Mean of the Post-test Scores shows large difference from the Pre-test Scores of the Experimental group. It is concluded that the Mean of the Post-test Scores of the Experimental group is significantly greater than that of Pre-test Score.

Difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of Control group

The second objective was to find out whether there is significant difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of control group. For this the investigator formulated research hypothesis which states that "There exists a significant difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of the Control group".

The investigator formulated the null hypothesis in order to test the research hypothesis. The null hypothesis is stated below;

H₀: "There exists no significant difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of the Control group"

The investigator administered Pre-test and Post-test on Achievement in Physics for Control group and thus obtained the data needed for testing the null hypothesis. The difference in the Scores on Pre-test and Post-test was found out. The investigator tested the hypothesis using the test of significance of difference between the means of two correlated groups. The levels

of significance was fixed at .05 level for degrees of freedom 34. The detailed description of analysis is presented in the table 2

Table 2. *Test of Significance of the Difference between the Means of Scores of Pre-test and Post-test of Control group*

Scores	N	Maximum Scores	Mean	Standard Deviation	t value	Df	P value
Pre-test		40	12.74	1.96			
Post-test	35	40	21.42	4.19	13.68	34	< .001*

* Significant at .05 level.

The investigator, from the table 2, observes that the Means of the Pre-test and Post-test Scores on Achievement in Physics of the Control group are 12.74 and 21.42 and Standard Deviations are 1.96 and 4.19 respectively. The calculated 't' value is 13.68 which are more than 2.04 at .05 level of significance. Therefore the null hypothesis "There exists no significant difference in the Means of Scores of Pre-test and Post-test on Achievement in Physics of Control group" is not accepted and hence the research hypothesis is accepted. The investigator found that there is a significant difference between Pre-test Scores and Post-test Scores on Achievement in Physics of the Control group at .05 level of significance.

CONCLUSION

From the above results the investigator concluded that there exists a significant difference between the Means of the Pre-test and Post-test Scores of control group. It is observed that the Mean of the Post-test Scores shows large difference from the Mean of the Pre-test Scores of the Control group. It is concluded that the Mean of the Post-test Scores of the Control group is greater than the Mean of the Pre-test Scores of the Control group. Comparing the results with that of Experimental Group, the Control Group falls short of achievement in the performance of subject considered. Hence, Guided Discovery Learning can be motivating also; it incorporates the individual's pleasure of successfully solving problems and recalling information.

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