Effect of Active Learning Method on Achievement in Science among Secondary School Students

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Abstract: *The rapid advancements in the field of teaching and learning have made remarkable changes in the traditional educational systems. It adopts modern pedagogical techniques in teaching-learning process and creates innovative learning environments that motivate the students for better learning. Active learning is one among them. Active learning has gained popularity in various educational settings, from primary schools to higher education institutions. It aims to provide greater flexibility and adapt to the changing needs of modern learners. The present study is intended to examine the effect of active learning method on achievement in science among secondary school students. Experimental method was used for the study. The researcher used pre teat posttest experimental and control groups design for the study. A sample of 80 nineth standard students from Thiruvananthapuram district of Kerala is selected for the study. The data were collected using a pretest and posttest before and after the intervention using active learning method to experimental group and demonstration method to control group were analysed using different statistical techniques like mean, standard deviation and Analysis of Co variance, ANCOVA. The findings of the study revealed that active learning method was effective for enhancing achievement in science among secondary school students.*

Keywords: Active learning, Achievement, Science, Secondary school students

I. INTRODUCTION

Lecturing styles and techniques have been the subject of international pedagogical research for decades. With attendance levels waning at most teaching institutions the lecture as an education tool is being held up to scrutiny in terms of how it contributes to the goals of education. The conventional lecture model holds little regard for students" existing knowledge of a topic. The impersonal nature of the large group makes it difficult to determine whether students have grasped a particular concept or not. When students are passive, high learning goals beyond basic recall and description cannot be easily achieved. Understanding, application of the information to new situations and motivation for further learning and evaluation are generally not achieved during a conventional lecture (Gibbs, 1988). Researchers question the lectures' role in engaging and inspiring students. There is a lot of emphasis in current literature on introducing "active learning" to large group lectures to overcome the issues with the traditional teacher-led approach to lecturing.

New learning tools and techniques, such as active or experiential learning, that have the potential to enhance an educational environment are of particular interest to business school researchers (Barak, Lipson, & Lerman, 2006). Active learning is generally defined as any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing. While this definition could include traditional activities such as homework, in practice active learning refers to activities that are introduced into the classroom. The core elements of active learning are student activity and engagement in the learning process. Active learning is often contrasted to the traditional lecture where students passively receive information from the instructor.

II. NEED AND SIGNIFICANCE OF THE STUDY

Active learning stands in contrast to standard modes of instruction in which teachers do most of talking and students are passive. It refers to techniques where students do more than simply listening to a lecture. Activities that involve students in doing things about what they are doing may be called the Active Learning. Active learning Methodology is also a form of activity-based learning. In this method the students involve in reading, writing, speaking, drawing, sharing, expressing the skill and questioning individually and in groups. Active Learning involves students in doing things and thinking what they are doing.

One of the most significant aims of active learning approach is to high level thinking skills. Active learning shifts the focus from the teacher to the student. Active learning involves student in doing things and thinking about what they are doing pupils engage in higher thinking tasks. Students are asked to solve problems according to scientific method. According to the Active learning approach, team work in small groups plays a crucial part in the lesson. Practicing exercises in problem solving leads students to pay attention to their thinking strategies. The new knowledge that they develop is organized, analyzed, applied and evaluated through thinking procedures. Active learning encourages total development of children and gives quality in education. Children should be encouraged to think and observe independently. Reducing the load of non- comprehension by facilities child – centered and active learning process. It is in this context the researcher decided to conduct a study on the effect of active learning method on achievement in science among secondary school students.

Objectives

1.To compare the pre-test scores of experimental and control groups with respect to their achievement in science
2. To compare the post-test scores of experimental and control groups with respect to their achievement in science
3. To find out the effect of active learning method on achievement in science among secondary school students.

Hypotheses of the Study

1. There is no significant difference between the Pre-test scores of experimental and control groups with respect to their achievement in science
2.There is no significant difference between the Post-test scores of experimental and control groups with respect to their achievement in science
3. Active learning method would be effective on achievement in science at secondary school level

III. METHODOLOGY

Methodology used for the study is given below:

a. Method

Experimental method is used for the present study in order to assess the effect of active learning method for teaching science at secondary school level by comparing it with lecture cum demonstration method. Two non-equivalent intact class room groups were selected for the study.

b. Variables under study

Variables are the condition or characteristics that the experimenter manipulates, controls or observes (Best and Kahn, 2005, Research in Education p.162). There are two types of variables namely dependent variable and independent variable. For the present the present study *Active Learning Method* as dependent variable and *Achievement in Science* as independent variable.

c. Population

The population for the present study consisted of secondary school students in Thiruvananthapuram district of Kerala.

d. Sample

The target group for the experimental study is the 8th standard students of Govt. Higher Secondary School, Neyyanttinkara, Thiruvananthapuram District, bearing 80 students.

e. Tools

1. Lesson transcripts based on Active learning method and Lecture cum Demonstration method for standard IX for teaching the topic 'Let's Regain our Fields'
2. Achievement test in science based on the Topic 'Let's Regain our Fields'.

f. Procedure for the study

An achievement test from the 9th standard science portion is conducted as pre- test to both experimental and control groups. After the teaching learning activities, using ALM method for the experimental group and traditional lecture cum demonstration method for control group, a post-test is conducted by using the same achievement test and their achievement is evaluated and analysed statistically. The data thus collected were subjected to further statistical analysis in order to verify the hypotheses.

g. Statistical Techniques used for the study

The following are the major statistical techniques used for the present study Mean, Standard Deviation, Test of significance (t-test), and Analysis of Co variance (ANCOVA)

IV. ANALYSIS AND INTERPRETATION OF DATA

Table 4.1: Comparison of the Pre-test Scores of Control and Experimental Groups: Data and Result of the Test of Significance

Groups	Number	Mean	S.D	t	Remarks
Experimental	40	15.85	4.32	1.60	Not significant
Control	40	17.45	4.68		

From Table 4.1 it is clear that 't' value obtained is 1.60 is less than Table value 1.96 at 005 level, and hence there is no significant difference between the pre-test scores of control and experimental groups. From this, it is clear that the two groups more or less same in their initial achievement in Science. Since the result not confirms the Hypothesis framed in this context i.e., the **Hypothesis I** *'there is no significant difference between the Pre-test scores of Experimental and Control Group with respect to their achievement in science'* is **accepted.**

Comparison of the Control Group and Experimental Group with Respect to Their Post-Test Scores

A post-test was administered to both control and experimental groups to measure their achievement in order to test the effectiveness of active learning method on achievement in science at secondary school level. In order to find out the significant difference between post-test scores of the control and experimental groups, the critical ratio of the post-test scores was calculated. For this, Mean and standard deviation of the post-test scores of the two groups were calculated. The data and the result of the test of significance are given in table 4.2

Table 4.2: Comparison of the Post-test Scores of Control and Experimental Groups: Data and Result of the Test of Significance

Groups	Number	Mean	S.D	t	Remarks
Experimental	40	26.43	6.38	4.31	Significant
Control	40	21.05	5.88		

From Table 4.2 it is clear that the 't' value obtained is 4.31 which is significant at 0.01 level of significance. Since the obtained t (4.31) is greater than table values 2.58 at 0.01 level, there is significant difference between the post-test scores of control and experimental groups **(C.R=4.31;p<0.01).** Since the result confirms the Hypothesis framed in this context i.e., the **Hypothesis II** *'there is no significant difference between the Post-test scores of Experimental and Control Group with respect to their achievement in science'* is **rejected.**

Genuineness of the difference in performance

The two groups selected for the present study were non-equivalent intact class room groups. It was difficult to find out whether the difference between the pre-test and post-test scores obtained from the experimental factors, so it became necessary to analyse the data by using the statistical technique, Analysis of Covariance (ANCOVA). This test permitted the investigator to statistically control the differences on the pre-test so that the post-test differences would not be due to initial differences before training.

Table 4.3: Summary of Analysis of Co variance of Pre test and Post test Scores of Experimental and Control groups (ANCOVA)

Source of Variance	df	SS_x	SS_y	SS_{xy}	SS_{yx}	$MS_y(v_{yx})$	F_{yx}
Among group mean	1	0.99	553.28	23.38	432.4	532.4	
Within group mean	77	911.27	1095.71	403.44	1019.0	13.2	41.11
Total	78	912.26	1648.99	426.82	1451.4		

The obtained value of F_{yx} is 41.11 and it is greater than table value at 0.01 level(i.e,=6.96). This shows that the final mean scores of treatment groups differ significantly after they have been adjusted for differences in the post test achievement scores in science. The data for adjusted means of post test scores of students in experimental and control groups is given in table 4.4

Table 4.4: Data for Adjusted Means of Post test Scores in Experimental and Control Groups

GROUPS	N	M_X	M_Y	M_{YX}
Experimental	40	15.85	26.43	28.36
control	40	17.45	21.05	19.52
Total	40	16.65	23.74	

Difference between adjusted Means (M_{yx}) of experimental and control groups =8.84 which is greater than 6.96 implies that the both the groups differ significantly at 0.01 level. It can be interpreted that the analysis of covariance among adjusted means of experimental and control groups revealed that there is significant difference between experimental and control groups with respect to achievement i.e., active learning method (M_{yx} =28.36) is significantly superior to lecture cum demonstration method (M_{yx} = 19.52) with regard to Post test achievement scores. Hence the Hypothesis formed in this context i.e., **Hypothesis III** Active learning method would be effective on achievement in science at secondary school level *at Secondary School level* is accepted.

V. FINDINGS OF THE STUDY

Comparison of the control group and experimental group with respect to their pre-test achievement scores in science showed that the 't' value obtained is 1.60 is less than table value 1.96 at 0.05 level, there is no significant difference between the pre-test scores of control and experimental groups**.** From this, it is clear that the two groups more or less same in their initial achievement on the topics 'Let's Regain our Fields'.

Comparison of the post-test scores of control and experimental groups showed that 't' value obtained is 4.31 is greater than table value 2.58 at 0.01 level, there is significant difference between the post-test scores of control and experimental groups.

The F ratio for the Pre test and Post test Scores was tested for significance by means of analysis of Covariance. The obtained value of F_{yx} is 41.11 which is greater than table value at 0.01 level(i.e,=6.96). This showed that the final mean scores of treatment groups differ significantly after they have been adjusted for differences in the Post test achievement scores in science. Difference between adjusted Means (M_{yx}) of experimental and control groups =8.84 which is greater than 3.2868 implies that the both the groups differ significantly at 0.01 level. This revealed that there is significant difference between experimental and control groups with respect to achievement i.e., active learning method (M_{yx} =28.36) is significantly superior to lecture cum demonstration method (M_{yx} = 19.52) with regard to Post test achievement scores,

Educational Implications

Teachers can engage with students in simple ways initially, taking account of students existing views and making the subject relevant to encourage their engagements. They can introduce new subject through the personal engagement of students and can find out what the student's know and understand. Interplay of social personal experiences of students should be fostered in the process of learning. Social interaction and encouragement can give effective feedback from students. Authoritative discourses of teachers should be reduced, and more guidance should be given to students.

In active learning, students develop their own narrative and share expertise with their classmates, so that they may all have access to entire topic. The availability of learning material, grouping of pupils, good approach and preparation by the teacher also support from school administration and parents are some of the supporting factor of active learning.

VI. CONCLUSION

The present study arrived at the conclusions that there is no significant difference between the pre-test scores of experimental and control group with respect to their achievement in science**.** Further it is found that active learning method is effective than lecture cum demonstration method on achievement in science at secondary school level. Hence it can be concluded that in order to enhance the methodology of teaching in the present scenario of education more learning materials are to be provided to students so that they can learn effectively through their active participation in the learning process.

REFERENCES

[1]. Barak, M., Lipson, A., & Lerman, S. (2006). Wireless Laptops as Means For Promoting Active Learning In Large Lecture Halls. Journal of Research on Technology in Education, 38(3), 245-263.

[2]. Best, J.W. & Khan, J.V. (2006). Research in Education. New Delhi: Prentice Hall of IndiaPvt. Ltd.

[3]. Fikret, Tuna(2012). Using active learning strategies to motivate students. Mathematics Teaching in the Middle School, 8: 48-51.

[4]. Garrett, H.E. (1995). Statistics in Psychology and Education. Bombay: Vakils, Feffer and Simons Ltd.

[5]. Gibbs, G. (1988). Learning by doing: a guide to teaching and learning methods, London: Further Education Unit

[6]. McKeachie, W. J. (1999). Teaching Tips: Strategies, research and theory for college and university teachers. Boston: Houghton Mifflin

[7]. Sukhia, S.P. (1983). Elements of Educational Research. New Delhi: Allied Publishers Pvt. Ltd.

[8]. http://www.glos.ac.uk/gdn/gibbs/index.htm

[9]. http://www.ed.gov/databases/ERIC_Digests/ed340272.html

[10]. www.deltasigaz.com