

# A Study On Effectiveness Of Learning Physical Science Through Activity Based Methods At Secondary Level In Alipurduar District Of West Bengal

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**Abstract:** The present study is an effort to find out the effectiveness of teaching through ABML over the traditional methods in the secondary level Hindi medium government schools in Alipurduar district of West Bengal. The study revealed that various low cost teaching aids and experiments can be developed by the teachers for activity based methods of learning and proper utilization of those leads to the improvement of achievement level in Physical Science of both the genders of students. The study is based on the author's experimentation and experience in teaching physical science at secondary level in government Hindi medium school and participation in various state and district level workshops on ABML.

**Key term:** Activity based methods of learning (ABML), traditional method, achievement level, physical science, secondary level.

## I. INTRODUCTION

India being a developing country and with limited resources, improving the quality of education is always a challenging task. To maximize the achievement of the students within a given limited set up is therefore the goal of every educationist and administrator. Using a variable like Activity Based Methods of Learning (ABML) is therefore one of the many ways of maximizing the achievement of the learners. Based on the recommendations of National Curriculum framework or NCF-2005, ABML is newly implemented in the school curriculum of West Bengal. Textbooks of all subjects at secondary level were redesigned to contextualize the practice of teaching learning through Activity based methods. This transition from traditional method to activity based method has a direct effect on the achievement level of the students.

## II. SIGNIFICANCE OF THE STUDY

The study by author is important to understand the need and way of developing low cost teaching aids and activity based experiments that can be used in classroom by both the teacher and students. Though the study is conducted in one district of West Bengal but it also has significance in state and national level regarding improving the achievement level of the students in Physical Science through ABML.

## III. OBJECTIVES OF THE STUDY.

The main objectives of the study are:-

- 3.1. To prepare study materials on Activity Based Methods on physical science at secondary level.
- 3.2. To find out the effectiveness of Activity Based Methods over Traditional Method on physical science at secondary level.
- 3.3. To analyze the effectiveness of Activity Based Methods among boys and girls on physical science at secondary level.

## IV. HYPOTHESIS OF THE STUDY.

- H1. There will be significant effect of Activity Based Methods over Traditional Methods on physical science at secondary level.
- H2. There will be significant effect of Activity Based Methods among boys and girls on physical science at secondary level.

## V. DELIMITATION OF THE STUDY.

The following delimitations are observed in the present study:

- 5.1. The study was limited to the Alipurduar district of West Bengal only.
- 5.2. The study was limited to the West Bengal government aided Hindi medium schools only.
- 5.3. Only achievement in Physical Science was studied.

## VI. REVIEW OF RELATED STUDIES

Let us now review some of the studies related to the present study of the author. Akkus (2015) in a study found that skill in ABML for pre-service teacher is helpful in developing their knowledge and skill about teaching profession. A study by Awasthi (2014) showed that ABML can bring improvement in the quality of education in India, such methods can not only be useful for general students but also for child with special needs (CWSN). It makes learning student centric by giving them liberty and individuality. Also the role of teacher in ABML is as a facilitator and guide. Similar study was done by Shah and Rahat (2014) showed that ABML has significant effect on improving the skill, understanding and knowledge of the learner. A study by Agarwal (2013) in Chandrapur district of Madhya Pradesh revealed that ABML improved the achievement level of student of primary level and it makes teaching learning more joyful and reduced burden from both teacher and student. A study by Khatoon and Sharma (2010) tested the achievement in science over various variables and it revealed that teaching aid like computer with internet has an effect on science achievement but gender, religion and single sex school has no effect on the science achievement.

### What is an Activity Based Methods of Learning?

According to UNICEF – ‘Activity based learning is a methodology where children of different age group are grouped together in one classroom and each of them learn at his or her own pace through a series of activities in form of learning ladder, with teacher acting as a facilitator of child learning. Activity based teaching provide opportunity for measuring learning through experience, direct observation and participation of children (Mishra and Yadav, 2013).

### Need of lowcost teaching learning material for ABML and how to prepare them?

Since most the government schools are suffering from lack of resources and many of them are situated in rural areas so it is essential for teachers and authorities to use the locally available inexpensive materials to prepare teaching learning materials like models, charts, experimental setups, audio-visual aids etc. some of such low cost experiments developed by the author with the active participation of students are listed below.

- Activity to prepare atomizer spray with small glass bottle and empty pen refill to learn principle of Bernoulli.
- Activity to understand pressure inside water column by an experimental model with plastic bottle having multiple holes at different height from top end, filled with water.
- Activity to understand Archimedes' Principle by an experimental model developed with partially water filled plastic bottle and cap of pen or very small glass bottle.
- Activity using Inclined Glass surface and droplet of glycerin and water experimental model to understand viscosity of liquids.
- Experiment with rotating boiled egg and an un-boiled egg to explain viscous drag.

## VII. DESIGN OF THE STUDY.

For the present study author used pre-test post-test control group experimental design.

## VIII. POPULATION OF THE STUDY.

Twenty eight thousand five hundred sixty four students from sixty one government and government sponsored schools of Alipurduar district of West Bengal was taken as population for the present study.

## IX. SAMPLE OF THE STUDY.

As a sample 200 students of class IX of three govt. Hindi medium secondary schools were randomly selected by the Author. The sample was further categorized into two groups, control group and experimental group, each consisted of 100 students. The two groups equally had 50 boys and 50 girls.

## X. TOOLS USED FOR STUDY.

Low cost experimental models were developed and used as teaching aids by the author. Control group was treated with traditional method where as experimental group was treated with ABML. Precautions were taken while doing activities as suggested by Awasthi (2014, p-76). The achievement level of the students was measured using teacher made achievement test. The achievement test was developed by taking into consideration its reliability and validity.

## XI. PROCEDURE OF DATA COLLECTION.

The scoring of the test of both the control group and experimental group during Pre-test and Post-test was done with the help of answer cum score key and the data were tabulated for analysis. For analysis of data statistical methods like mean, median, standard deviation, standard error and t-test were used.

## XII. ANALYSIS OF THE RESULT.

Table 12.1: Pre-test central tendency and t-value of control group and experimental group

Category	N	Mean	SD	t-value	Level of significance
Control group	100	4.63	2.791	1.503	Not significant
Experimental group	100	4.069	2.479		

Table 12.2: Pre-test t-value of control group with respect to gender.

Control group	N	Mean	SD	t-value	Level of significance
Boys	50	4.80	2.843	0.626	Not significant
Girls	50	4.46	2.757		

The obtained t-value is 0.626 for 98 degrees of freedom which is less than the t table value of 1.66 and 2.364 at 0.05 and 0.01 level of not significance for one tail test, hence it can be said that there was no significant difference between the mean value of score of boys and girls of control group.

Table 12.3: Pre-test central tendency and t-value of experimental group with respect to gender.

Experimental group	N	Mean	SD	t-value	Level of significance
Boys	50	3.96	2.571	0.556	Not significant
Girls	50	4.24	2.462		

The obtained t-value is 0.556 for 98 degrees of freedom which is less than the t table value of 1.66 and 2.364 at 0.05 and 0.01 level of not significance for one tail test, hence it can be said that there was no significant difference between the mean value of score of boys and girls of experimental group.

Table 12.4: Post-test central tendency t-value of control group and experimental group.

Category	N	Mean	SD	t-value	Level of significance
Control group	100	8.91	3.114	5.970	Significant at 0.05 and 0.01 level
Experimental group	100	11.65	3.374		

The obtained t-value=5.97 for 198 degrees of freedom is greater than the table value of 1.66 and 2.364 at 0.05 level and 0.01 level respectively of significance on one tailed test. Hence there was a significant difference between the mean of scores of two groups. Hence the hypothesis  $H_1$  was accepted true. Here the researcher used one tailed test because there was every reason to believe that the treatment will produce change in achievement in physical science in positive direction.

Table 12.5: Post-test central tendency and t-value of control group with respect to gender.

Control group	n	Mean	SD	t-value	Level of significance
Boys	50	7.92	2.854	3.327	Significant at 0.05 and 0.01 level
Girls	50	9.9	3.092		

The obtained t-value is 3.327 for 98 degrees of freedom which is greater than the t table value of 1.66 and 2.364 at 0.05 and 0.01 level of significance, hence it can be concluded that there was a significant difference between the mean of score of boys and girls of control group. So girl's achievement level improved significantly over boys

Table 12.6: Post-test central tendency and t-value of experimental group with respect to gender.

Experimental group	N	Mean	SD	t-value	Level of significance
Boys	50	11.18	3.082	1.34	Not significant
Girls	50	12.5	3.612		

The obtained t-value is 1.34 for 98 degrees of freedom which is less than the t table value of 1.66 and 2.364 at 0.05 and 0.01 level of not significant, hence it can be concluded that there was no significant difference between the mean of score of boys and girls of experimental group. Hence the hypothesis  $H_2$  was rejected. So the girl's achievement level was not significantly higher than the boys when treated with activity based methods of learning. Which showed achievement in physical science through ABML is not gender specific.

### XIII. GRAPHICAL INTERPRETATION OF THE RESULT.

#### 13.1. Treatment wise interpretation of result.

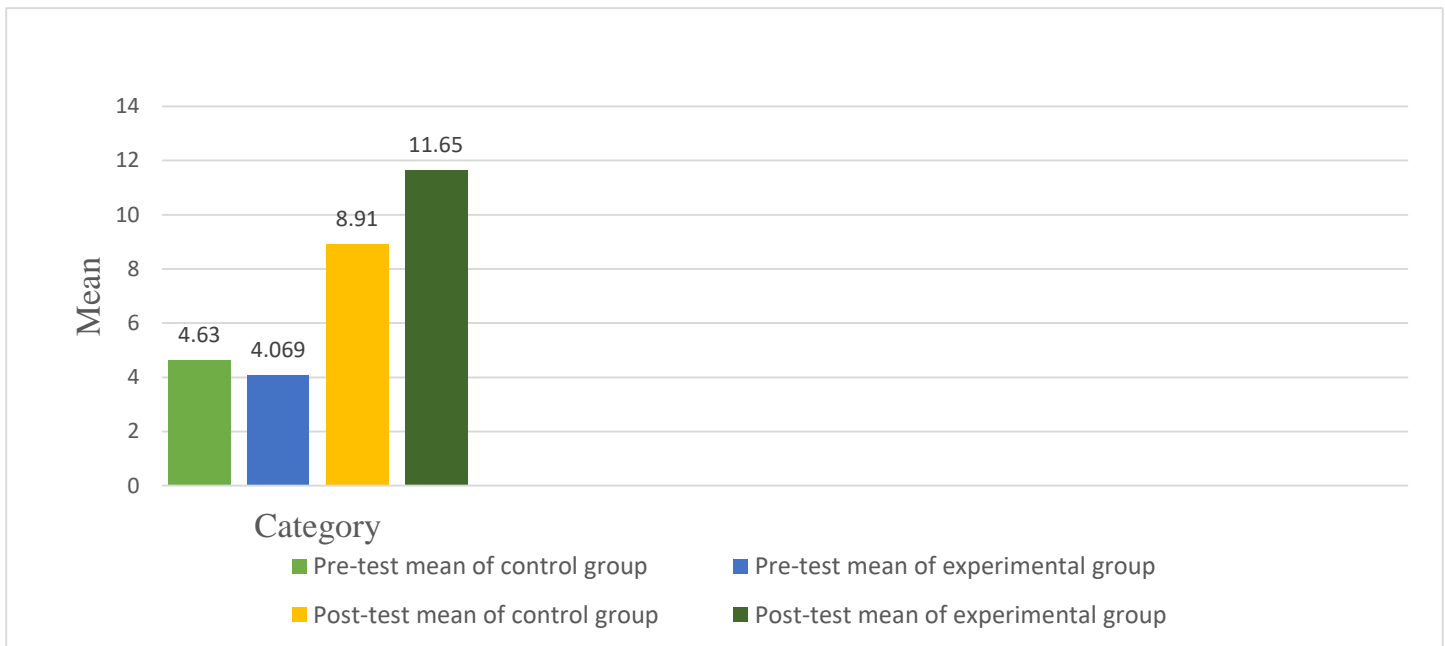


Figure no. 13.1.1: Comparative graph of pre-test and post-test means of control group and experimental group.

The author's first hypothesis  $H_1$  stated as, "There will be significant effect of activity based methods over traditional methods on physical science at secondary level". Now as represented in the figure no.13.1.1 the post-test mean of experimental group is higher than the control group. The significance of means were tested in table no.12.4, which revealed that post-test t-value of means of both groups was 5.970, which turned out to be significant whereas the t-value of pre-test means of both the groups were insignificant with t-value 1.503 as shown in table 12.1. Thus before any kind of treatment the achievement of both groups were very low with insignificant difference in mean but after traditional and activity based methods of treatment both the treatments helped in improving the achievement level of samples but there was significantly more improvement through activity based methods of learning over traditional method of learning. It means that activity based methods is superior to traditional method. Similar finding was made by Mishra and Yadav (2013). Thus the researcher's hypothesis  $H_1$  was accepted.

#### 13.2. Gender wise interpretation of the result.



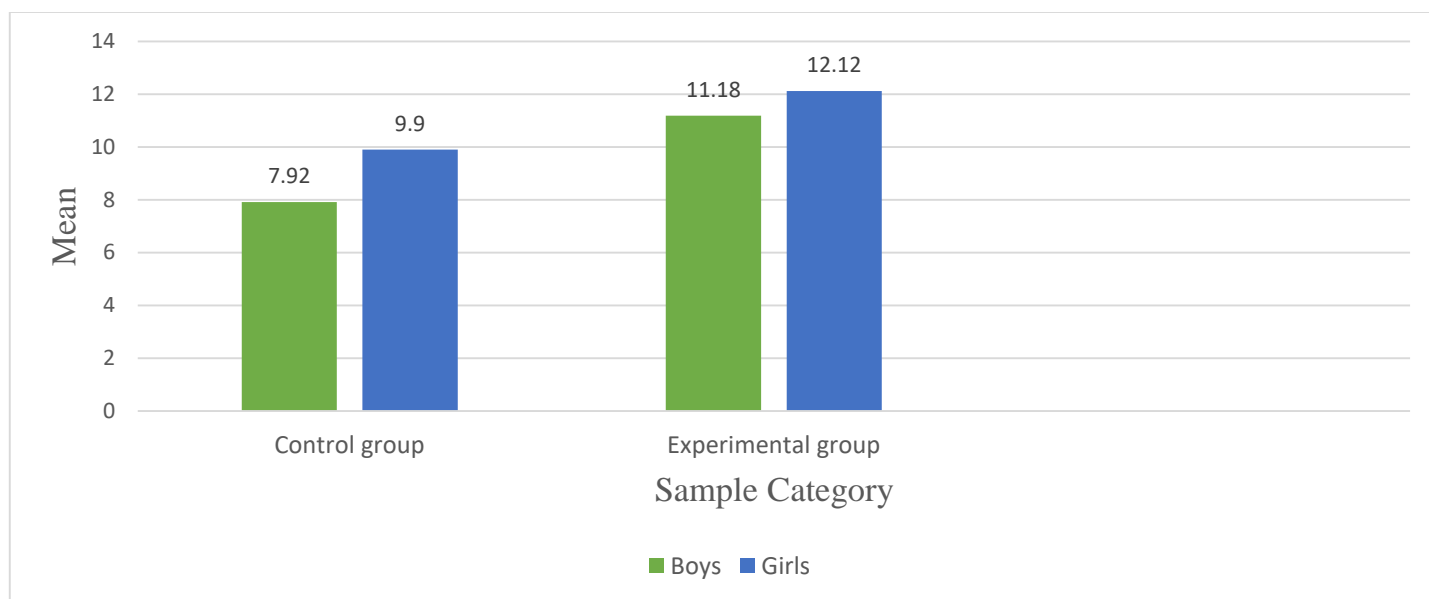


Figure no.13.2.1. Post-test Gender wise comparative graph

In figure no.13.2.1 post-test comparison was made between the genders of the control group and the traditional group. Both the genders did better in level of achievement than pre-test result but post-test achievement of experimental group was significantly higher than control group. When analyzed gender wise girls found to did better than boys in both groups. Table no.12.5 showed t-value of control group boys and girls was 3.327 so the achievement was significant among the boys and girls whereas table no.12.6 showed t-value of experimental boys and girls was 1.34 which made the level of achievement among boys and girls received activity based treatment insignificant. It was hence could be interpreted that activity based methods helped in bring achievement on physical science of both the gender in equal level. Thus researcher's second hypothesis  $H_2$ , stated as, "There will be significant effect of activity based methods among boys and girls on physical science at secondary level." was rejected. The study helped in revealing the importance of activity based methods for learning as it leads to improvement of achievement among boys and girls at comparable level irrespective of gender which contradict the finding of Mishra and Yadav (2013, p-731).

#### XIV. MAJOR FINDING OF THE STUDY.

The various teaching aids like low cost experiments and models developed for activity based learning are useful and effective in learning physical science at secondary level.

14.1.The achievement level of students in Physical science of experimental group treated with activity based learning methods was higher than the students of control group treated with traditional method.

14.2.Activity based methods helped in uplifting the achievement level of both the genders at comparable level.

14.3.Post-test performance of both the genders of experimental group was higher than both the respective genders of control group.

#### XV. EDUCATIONAL IMPLICATION OF THE STUDY.

The present study showed high superiority of activity based approach over the traditional methods. Activity based methods not only improved the achievement of students in physical science but it also helped in increasing the level of interest of students in subject. Such approach of learning increased the feeling of co-operation, competition, constructivism and rational thinking among the students. Some of the major educational implications of the present study are given below:

15.1.Activity based approach can be equally effective for both boys and girls.

15.2.Activity based approach can provide joyful and interesting environment in the class room.

15.3.Very low cost materials can be used in schools as teaching aids and for conducting experiments.

15.4.Such activity based methods can be implicated in other level of education.

15.5.Activity based methods can be used at educational institution other than school also for making teaching learning process more learner centric.

#### XVI. SUGGESTIONS FOR FURTHER STUDY.

Some of the aspects that were not considered or taken within the scope of present study but could be utilized for further studies are listed below:

16.1. In the present study only sample from Hindi medium school was taken, so further studies can be done on other medium schools.

16.2. Similar studies can be conducted in private schools also and a comparison with government schools can be made.

- 16.3. The present study can be extended to cover elementary and higher secondary level schools for studying the effectiveness of activity based methods.
- 16.4. Such studies can be done to see the effect of activity based approach on the improvement of achievement of physically disabled students.
- 16.5. Various researches can be made on projects and programs launched by government related to promoting activity based learning.

## XVII. CONCLUSION.

So one can use low cost materials for activity based methods of learning and such learning is student centric. It definitely improves the achievement of students in physical science irrespective of their gender over the traditional methods of learning.

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