

Annual Methodological Archive Research Review

<http://amresearchreview.com/index.php/Journal/about>

Volume 3, Issue 4 (2025)

Effect Of Activity Based Learning On Student's Academic Achievement And Motivation In Mathematics Subject At Secondary Level

Kinza Jabeen¹, Zafar Muhammad², Saima Bibi³, Wajid Ali Shah⁴,
Naveed Khan⁵

Article Details

Keywords: Activity Based Learning, Academic Achievement, Secondary Level.

¹**Kinza Jabeen,**
MPhil scholar, Department of
Education Northern University
Nowshera,
awany2573@gmail.com

²**Zafar Muhammad,**
MPhil scholar, Department of
Education Northern University
Nowshera,
Zafar3111.zm@gmail.com

³**Saima Bibi,**
MPhil scholar, Department of
Education University of Education
Attock,
Saima724622@gmail.com

⁴**Wajid Ali Shah,**
MPhil scholar, Department of
Education Northern University
Nowshera,
Vjazzofficial5@gmail.com

⁵**Naveed Khan,**
MPhil scholar, Department of
Education Northern University
Nowshera
Saminaveed27@gmail.com

ABSTRACT

This research study was conducted to inspect the effect of activity based learning on students' academic achievement and motivation in the subject of mathematics at secondary level. The objectives of the study were (i) to determine the effect of activity based learning on students' academic achievement in mathematics at secondary level (ii) to probe the effect of activity based learning on students' motivation towards mathematics. To accomplish the given objectives following null hypothesis were tested H01. There is no significant effect of activity based learning on students' academic achievement H02. There is no significant effect of activity based learning on students' motivation towards mathematics. In nature the research was experimental "pre-test post-test equivalent group design" was used. All the secondary school students studying Mathematics was the population of the study. Sampled size of the study was 60 girls students of grade-VIII Government Girls High Secondary School No.1 Cantt Nowshera. Pre-test and post-test were used as research instruments. Duration of treatment was eight weeks. Data were collected personally by the researcher. Dependent t-test, independent t-test and percentage were used for data analysis. On the basis of findings, the suggestions and recommendations were made. The study was significant for teachers, students and policy makers.

Introduction

With passage of time ongoing teaching methods gradually replaced by more innovative and dynamics teaching methods which rapidly changing educational environment. It is possible to design mathematics courses with a narrow or broad philosophy for the students. In a narrow sense, philosophy of mathematics education is concerned with the goals or reasons underlying the practice of mathematics education. On the other hand, objectives, purpose, goals and aims etc, for teaching of the subject of math do not exist in a vacuum, belonging to all sort of persons whether individual person or social groups (Ernest, 1994).

As stated by Hein (1991) activity-based learning (ABL) is a learning theory of constructivist, this theory is basically a cognitive-learning theory. Based on previous experience, each person "constructs" their own learning and knowledge process, as per the constructivist view of learning. This theory of learning hypothesizes that learning is taking place when an individual's psychological environment connects with a specific framework. It is imperative for construction students to have different activities in their learning inside classroom. For that reason, this theory is also mentioned as problem-based learning theory by many psychologists and scholars. Activity-based learning is useful for contextualizing learning for students.

As reported by Rahat (2014) the learner has the ability to learn and start to develop their ideas about the world through individual actions and experience. According to their own thoughts and experiences, they assess things. Teaching based on activity helps the learners to build their knowledge.

In accordance with Öcal (2012) activity-based learning is an important technique that teaches individuals to study about their own problems in new ways, helps to make it easier to find concrete solutions, and provides students with self-esteem to learn in their development period.

Activity based education indicates towards learning where learners, in any subject, mentally and physically travel subject by manipulation of tools and materials related to the world of the work environment, simulation of the work environment, or performing of a real work task. Knowledge, attitudes and skills are included in this theory of learning (Ravi & Xaviera, 2007).

Literature Review

Different research findings on the value of activity-based learning and its impact on educational attitude and achievement towards math are found in national and international literature. As long as learners find the material and method of teaching exciting and enjoyable, they actively engage throughout the learning process. Even though in terms of learning, the use of teaching activities during classroom teaching is important. Activities used during classes will lead to the continuity of learning, generate positive attitudes in the learners towards the class and attract interest in the class (Camci, 2012).

According to Ruby (2001) hand on activities comprise all practical performance whether actual or simulated performed in or outside the lab. Activities have long been used in scientific education, dating back to the concepts of labs. Activity method differs from the former method, as it was limited to laboratories while the later one is more leaned towards practical work in classroom. Besides this, learning through activities is also helpful in memorizing most of the concepts which cannot be comprehended in the classroom without any practical work.

It was found in some studies, that the success of learners is increased through activity based teaching as compared to traditional teaching method. Activity-based learning strengthened the interpreting skills of the learners and broke the negative attitudes of the learners in the subject of mathematics, towards mathematics (Camci, 2012).

As mentioned by Lindberg (2001) Passive learning depends on addressing the problems presented in textbooks of mathematics and answers them. Thus many learners fail to respond because of the teacher's inappropriate or bad interpretations, or maybe because of the learner's fundamental absence of mathematical intelligence. In

depth, the student's good mathematics learning experience depends on the teacher's ability to introduce and illustrate algorithms, models, and laws, as well as the student's talent. In addition, on-going goals for attempting activities are determined by the teachers of mathematics and require learners to be excited about mathematics in order to enhance their understanding and learning.

Statement of the Problem

Conventional teaching strategies in mathematics mostly failed to engage learners and promote deep understanding of the subject which leads to insufficient result. Activity-Based Learning is a process in which learners actively participate in the lesson rather than passively sitting, listening and absorbing the lesson inside the classroom. The drive of the study is to practice this method for secondary level students. Problem under investigation is to determine the effect of activity based learning on the achievements gained in academic and motivation of learners at secondary level in mathematics subjects.

Objectives

Objectives of the study were

- To determine the effect of activity based learning on students' academic achievement in mathematics at secondary level.
- To probe the effect of activity based learning on students' motivation towards mathematics.

Hypotheses

Following null hypotheses were tested:

H₀₁. There is no significant effect of activity based learning on students' academic achievement.

H₀₂. There is no significant effect of activity based learning on students' motivation towards mathematics.

Methodology

Population

The target population of this study consisted of grade eight students from all public secondary schools in district Nowshera.

Sample

For experimental purpose one school was selected through convenient sampling technique. The sampled of the study were 40 girl students of Grade-VIII of Government Girls High Secondary School No.1 Cantt Nowshera. Sampled students were assigning to two groups i.e control and experimental paired random sampling technique.

Research Design

In this research study Pre-test-Post-test Equivalent-Group Design was used; the symbolic representation of research design is;

$$R_E = O_1 \quad T \quad O_2$$

$$R_C = O_3 \quad O_4$$

Where,

RC= Randomly Selected Control Group

RE= Randomly Selected Experimental Group

O1 is the observation based on the pre-test of experimental group;

T is the treatment was given to the sampled students while

O2 is the observation based on post-test of experimental group.

O3 is the observation based on the pre-test of control group;

O4 is the observation based on post-test of control group.

Research Tool

Data collect through teacher-made achievement test (pre-test, post-test) and an observational sheet, to quantify battling understudies' motivation towards mathematics subject.

Treatment

The treatment continued for six weeks. Groups were formed on the basis of pre-test mean scores using paired random sampling technique. Mean score pre-test had been used for measuring academic achievements of learners before the treatment. After 6 weeks, post-test was conducted to measure the academic achievements of learners after the treatment. Teacher develops sixteen lesson plans for conveying the task. Each lesson plan consists of objectives, audio visual aids, presentation (activities) and duration.

Procedure

Four chapters were taught from mathematics textbook of KP to the grade-VIII girl students by mathematics teacher. The length of the study was a six weeks. Sixteen lesson plans were prepared for the instructions. Teacher motivates girl's students to perform planned activities.

Data Collection

Data was collected personally through pretest and posttest, which were delivered to the sample learners. An observation sheet was also developed to observe students motivation.

Analysis of Data

The data collected through teacher-made pre-test, post-test and observational sheet, analyzed and interpreted by forming dependent group of t test. After calculation, the level of significance was found at 0.05.

H₀1. There is no significant effect of activity based learning on students' academic achievement

Table 1: Significant effect of activity based learning on students' academic achievement

Group	N	Mean	SD	V	Df	t-worth	Effect Size
Pre-test Experimental	30	23.6	3.78	14.3	29	12.94	Significant

Post-test Experimental	30	31.4	2.12	4.49
---------------------------	----	------	------	------

Significance level = 0.05,

Table Worth = 2.045

Table 1 depicts that the determined t-worth 12.94 was more noteworthy than table worth 2.045 which were huge at importance level (0.05); consequently the invalid speculation is dismissed. It indicates that there was significance difference between the mean score of pre-test experimental group and post-test experimental and after teaching through activity based learning. Based on pre-test and post-test results, mean and SD showed the tremendous distinction between pre-exploratory and post-trial gatherings.

Table 2: Significant difference between the learning of students in the subject of mathematics taught through activity based learning and conventional teaching method

Group	N	Mean	SD	V	df	t-worth	Effect Size
Post-test Experimental	30	34.4	3.48	12.11	59	8.109	Significant
Post-test Control	30	25.4	5.12	26.21			

Significance level = 0.05,

Table Worth = 2.001

Table 2 shows that the determined t-worth 8.109 was more noteworthy than table worth 2.001 which were critical at importance level (0.05); thus the invalid speculation is dismissed. It suggests that movement put together learning has importance impact with respect to battling understudies' scholastic accomplishment. Based on pre-test and post-test results, mean and SD showed the tremendous distinction between pre-exploratory and post-trial gatherings. The table worth shows that the experiential learning is essentially better compared to conventional learning. It shows that there was significant effect of activity based learning on student's academic achievements.

H₀2. There is no significant effect of activity based learning on students' motivation towards mathematics

Table 3 Significant effect of activity based learning on students' motivation towards mathematics

N	Participation		Performance		Improvement		Interest		Motivation	
30	Score	%	Score	%	Score	%	Score	%	Score	%
	37.25	62.08	14	46.66	16.5	55	13	43.3	80.75	53.8

Table 3 shows that, though two aspects of motivation is below 50% but improvement in participation and improvement cannot be denial which is more than 50%. It is evident from the table that 62.08, 46.66, 55, 43.3 and overall 53.8% showed that significant difference was found and students motivate after the

treatment.

Discussion

A study was carried out to explore the effect of activity based learning on the academic achievement and motivation of students in the subject of mathematics at secondary level. According to Su and Wang (2017) an activity consists of a minimum one action that fulfills the intended objective on its completion. In particular circumstances, all components of actions are often realized, which largely decide the conditions in which the actions can be carried out and the intended objective can be fulfilled.

As mentioned by Camci (2012) activity-based learning is a teaching method that accounts for the outcomes and behaviors in the curriculum for elementary and high school mathematics and intends to visualize circumstances of real-world problems. The objectives of the study were (i) to determine the effect of activity based learning on students' academic achievement in mathematics at secondary level (ii) to probe the effect of activity based learning on students' motivation towards mathematics.

Conclusions

- It was concluded from the results that activity based learning had significance effect on students' academic achievement in mathematics subject at secondary level.
- The result of the study shows that activity-based learning has significance effect on students' motivation and students take interest in mathematics subject.
- The percentage values (62.08, 55) were greater than 50 percent. It reveals that there was participation and improvement of the students in mathematics subject.

Recommendations

- It was closed from the outcomes that activity based learning had importance impact with respect to battling understudies' scholastic accomplishment and the student looked into the subject. Consequently it is suggested that instructors ought to show arithmetic and government should organized educator boost with activity based learning.
- The result of the study showed that activity based learning had significant effect on Mathematics skills. Hence it is recommended that curriculum should be included in the prescribed textbook of Mathematics.
- It was reasoned that the customary techniques for instructing are neither as per the requirements of our general public nor as indicated by the necessities of the students. Consequently it is suggested that it ought to be supplanted with action based learning.
- Keeping the benefits of activity based learning it should be included in the curriculum of teachers training for pre-service courses.

Acknowledgements

The creators might want to thank every one of the members for their commitments.

References

- Camci, C. (2012). Extended cross product in a 3-dimensional almost contact metric manifold with applications to curve theory. *Turkish Journal of Mathematics*, 36(2), 305-318.
- Ernest, P. (1994). The philosophy of mathematics and the didactics of mathematics. *Didactics of mathematics as a scientific discipline*, 335-350.
- Hein, G. (1991). Constructivist learning theory. *Institute for Inquiry*. Available at: <http://www.exploratorium.edu/ifi/resources/constructivistlearning.html>.
- Lindberg, A. S. (2001). Active learning of mathematics. *Experiential Learning for the Third Millenium*. Vol.

2, 159, 168.

- Malhotra, S. (2015). Teaching of mathematics in engineering by discussing the different conceptual ideas. In *2015 5th Nirma University International Conference on Engineering (NUICONE)* (pp. 1-2). IEEE.
- Öcal, S. D. (2012). A case study on mentoring in a teacher development program. *Journal of Education and Future*, 2, 31-48.
- Rahat, H. C. (2014). The effects of activity based learning on sixth grade students' achievement and attitudes towards mathematics activities. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(5), 1963-1977.
- Ravi, R., & Xavier, P. (2007). Activity Based Learning as Self-Accessing Strategy to Promote Learners' Autonomy. *Journal on Educational Psychology*, 1(2), 7-9.
- Ruby, A. (2001). Hands-on science and students' achievement. Retrieved Feb 29, 2024 from http://www.rand.org/pubs/rgs_dissertations/RGSD159/index.html.
- Su, J. M., & Wang, S. J. (2017). A Web-based learning activity integrated with scratch tool to support programming learning. In *2017 10th International Conference on Ubi-media Computing and Workshops (Ubi-Media)* (pp. 1-4). IEEE.