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# Effect of Activity-based Teaching-learning Strategy on Students' Achievement in Mathematics

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**Abstract**

*Pupils tend to learn mathematics through a meaningful approach to mathematics rather than by mechanical process. Therefore, for teachers as well as students of mathematics subject, learning methods are very important. Method is nothing but a scientific way of presenting the subject, keeping in mind the psychological and physical requirements of the children. For effective learning of mathematics the method has to be as good as the content. There are various methods used in mathematics teaching-learning. But, activity-based teaching-learning strategy is very useful in mathematics teaching-learning. Therefore, in this paper, the researchers had made an attempt to study the effect of activity-based teaching-learning strategy on students' achievement in mathematics.*

When the children involve in learning with full interest through activities, learning stands last fully and qualitatively in the mind of the children (Meera, 2005). In this connection, National Policy on Education (1986) recommended that a warm, welcoming and encouraging approach, in which all concerned share a solicitude for the needs of the child, is the best motivation for the child to attend school and learn. A child-centred and activity-based process of learning should be adopted at the primary stage. Whereas Rama (1998) stated that instructors must adopt active-learning approaches that view students as 'empty vessels' to be filled with academic content. Therefore, activity-based teaching-learning strategy provides right environment to create educational

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settings where the students work together and learn by doing, learn by playing, learn by enjoying, learn by co-operation, learn by activity and learn without tension.

## Procedure

The main objective of the study was to find out the effect of activity-based teaching-learning strategy on students' achievement in mathematics. Activity-based teaching-learning strategy is designed to teach the units on geometry. The researcher planned various activities under different concepts, such as, point, line segment, line, plane, angle etc. For this, the researcher analysed the related studies/ literature. On the basis of experience and feedback in try out the activity-based teaching-learning strategies are modified and these modified activities are implemented in experimental group. An example of activity as follows:

**Example**

**Activity : Concept of a point**

**Obejctives :** Students should be able to

- Make a mark on a sheet of paper with the help of any pointed object.
- Plot a point on a sheet of paper with help of a pencil.
- Plot a specific number of points on a sheet of paper with the help of a pencil.

**Time :** 15 minutes

**Materials**

- Polyhedron having quite sharp edges and vertices
- Sheets of papers
- Pencil

**Procedure**

1. The researcher distributes a sheet of paper to each student.
2. He calls the students one by one and asks them to make a mark on the paper with any one of the vertices of the solid (polyhedron) on the table. Students are allowed to take the sheets back to their seats.
3. He asks them, "What is marked on your sheet ?" They might all say, 'Vertex'. He may tell them that the vertex is still with the solid only. He can then tell them that whatever is marked on their sheets is called a point.
4. He then asks them to look at their pencil and points out the vertex. Having ensured that all of them point at the tip of the pencil, asks them to mark a point on their sheet.
5. He asks them to make a specific number of points on their sheets.
6. He asks a few of them to make a point on the chalkboard with the help of a chalk piece.

**Researcher's Say**

Usually, the idea of point is given as something having no length, breadth and width. This is totally illogical. The attempt to define a point is futile. As a matter of fact point is an undefined term. We should only try to give a feel of it and enable the children to plot a point.

The sample of the study constituted 80 students of Class VI of Government Sardar Patel and Old Champion Middle Schools. These schools are Hindi Medium, following Madhya Pradesh State Board Syllabus and located in the similar geographical area. Data were collected with the help of mathematics achievement test. The Mathematics Achievement Test is prepared by the researchers.

## Results and Discussion

**Table 1 : Significance of 't' between experimental group and control group on pre-test and post-test in respect of achievement in mathematics**

| *Test* | *Group* | *AM* | *SD* | *N* | *df* | *t* | *Sig.* |
|---|---|---|---|---|---|---|---|
| Pre | Experimental | 49.04 | 8.80 | 40 | 78 | .86 | .39 |
| | Control | 50.96 | 11.10 | 40 | | | |
| Post | Experimental | 57.27 | 6.77 | 40 | 78 | 9.48 | .00 |
| | Control | 42.73 | 6.96 | 40 | | | |

(Since V Class mathematics achievement scores are considered as mathematics achievement pre-test scores whereas mathematics achievement post-test is prepared by the researcher. Therefore, maximum scores are differed. In order to compare the mathematics achievement of students in pre-test and post-test, significance of difference of means is computed. And in order to make pre-test and post-test comparable they are converted in standard scores.)

It is observed that the value of 't', between experimental and control groups in pre-test on achievement in mathematics, is not found to be significant. This shows that the two groups are matched in terms of achievement in mathematics prior to experimentation and found that the students of both groups are similar in respect of their achievement in mathematics before commencement of the experiment.

Further, it is observed that the value of 't', between experimental and control groups in post-test on achievement in mathematics, is found to be significant at 0.01 level of significance and hence the hypothesis is rejected. This shows that students of experimental group do differ from their counterparts in control group in respect of achievement in mathematics. On comparison of means, it is found that students of experimental group (AM = 57.27) are ahead of their counterparts in control group (AM = 42.73) in achievement in mathematics. This indicates that the students of experimental group have better achievement in mathematics when compared to students of control group. From this it may be inferred that activity-based teaching-learning strategy helped students of experimental group to have better achievement in mathematics. The effect of activity-based teaching-learning strategy on achievement in mathematics is evident. This finding is in the line of various other results

of activity-based teaching studies e.g., Jain (1994), Mishra (1996), Panda (1996), Sharda (1998), Rao (1999) and Sujatha (2005). Jain (1994) found that it was more effective than the traditional method. Mishra (1996) showed a significant effect in achieving the gain scores on teacher-made test than that of traditional practice teaching. Panda (1996) found that the experimental group performed better than the control group in every unit as well as overall performance and it was found a better method as compared to the traditional method in developing mathematical concepts. Sharda (1998) found that it motivated children to concentrate on expected competencies and hence to achieve them at mastery level. Rao (1999) found that the activity-packs used had shown as very effective in achieving target performance. Sujatha (2005) found that it were very much suitable for slow learners. The children engaged well in all the activities.

Similar results are also given in some other interventional studies, e.g., Bussama (1993), Reddy and Ramar (1995), Mishra (1996), Manay and Rani (1998), Chaudhari, Vaidya, Navalakha and Mahapatra (1999), Gupta, Hooda and Kumar (2001), Vaughan (2002) and Sakhiya (2005). Bussama (1993) found that the simulation technique was better in learning mathematical topics than the traditional method. Reddy and Ramar (1995) studied the effectiveness of multimedia based modular approach in teaching mathematics to low achievers. Findings revealed that the experimental group performed significantly better than the control group on the post-test. Mishra (1996) found that pupils taught through competency-based teaching exhibited significant gains, which showed their change of behaviour in the learning outcomes and competency-based teaching strategy was proved to be best for classroom transaction. Manay and Rani (1998) had taken up a study on effect of puzzle programme in the development of cognitive and creative abilities among pre-school children. The results reveal that the experimental group performed significantly better than control group. Chaudhari, Vaidya, Navalakha and Mahapatra (1999) found that the gaming strategy and synectics model treatment was superior to the traditional method on achievement scores. Gupta, Hooda and Kumar (2001) had taken up a study to find out the effect of quiz-gaming on learning of science at elementary level. Thus we can conclude that the students who were taught science by using quiz-gaming exercise had shown significant improvement in their achievement as compared to the control group where science was taught through lecture method. Hence, quiz-gaming plays a vital role in improving the achievement of the students. Vaughan (2002) conducted a study on the effects of co-operative learning on the achievement in and attitudes towards mathematics of a group of 5th grade students of colours in a culture different from the

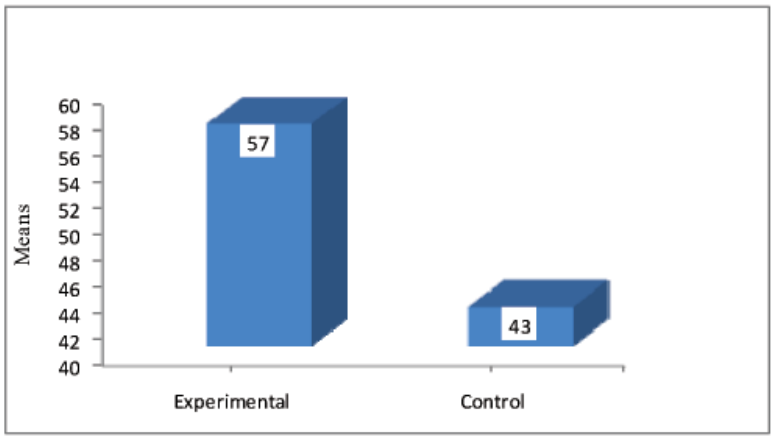


**Figure:** Graphical representation of the post-test comparison of means of experimental group and control group on achievement in mathematics

United States (i.e. Bermuda). Results suggest that there were positive gains in attitudes and achievement. Sakhiya (2005) found that Co-operative Language Learning (CLL) is more effective than traditional method in English language teaching. From these earlier studies and the present study it is evident that interventional inputs help the students to increase the level of achievement in mathematics. A graphical representation of the post-test comparison of means of experimental group and control group on achievement in mathematics is given in figure.

In order to compare the achievement in mathematics of students in pre-test and post-test, significance of difference of means is computed separately for experimental and control groups. The results are presented in table 2.

As the values of 't' shows, the students of both experimental and control group do differ in pre-test and post-test in respect of their achievement in mathematics. Though the 't' values between pre-test and post-test for both experimental and control groups in respect of their achievement in mathematics, are found to be significant at 0.01 level of significance,

**Table 2 : Values of 't' between pre-test and post-test in respect of achievement in mathematics**

| *Group* | *Test* | *AM* | *SD* | *N* | *df* | *t* | *Sig.* |
|---|---|---|---|---|---|---|---|
| Experimental | Pre | 49.04 | 8.80 | 40 | 39 | 5.94 | .00 |
| | Post | 57.27 | 6.77 | 40 | | | |
| Control | Pre | 50.96 | 11.10 | 40 | 39 | 4.55 | .00 |
| | Post | 42.73 | 6.96 | 40 | | | |

experimental group gained a better achievement in mathematics than their counterparts. On comparing the means, it is interesting to notice that the mean values of experimental group increased from pre-test (49.04) to post-test (57.27), whereas in control group the mean values are decreased from pre-test (50.96) to post-test (42.73). Though the entry level of achievement in mathematics among control group is ahead of experimental group, due to activity-based teaching-learning strategy the students of experimental group seem to have gained much. It shows that the activity-based teaching-learning strategy worked positively towards increasing the level of achievement in mathematics among students.

## Major Findings of the Study

The students of experimental group do differ significantly from their counterparts in control group in respect of achievement in mathematics on post-test. But the students of experimental group do not differ significantly from their counterparts in control group in respect of achievement in mathematics on pre-test. The mean values of experimental group increased from pre-test (49.04) to post-test (57.27), whereas in control group the mean values are decreased from pre-test (50.96) to post-test (42.73). The students of control group are superior to experimental group on pre-test of achievement in mathematics whereas they are found inferior to experimental group in post-test. Therefore, it is indicated that activity-based teaching-learning strategy helped students of experimental group to improve their achievement in mathematics.

## Implications of the Study

Normally, most of the children feel mathematics learning a burden. So, they do not take interest in mathematics learning. To arouse and maintain the students' interest in mathematics activity-based teaching-learning strategy plays a very important role. The teacher knows very well that loss of interest is the major cause of students' failure. If the student has to be taught properly, the natural curiosity would create interest in them and would develop their attention towards the subject. Activity-based teaching-learning strategy helps students to improve their achievement in mathematics. Results imply that activity-based teaching-learning strategy helps students to improve their achievement in mathematics. During experiment students learn more and effectively. So, this approach can give very good results for elementary classes. Therefore, in schools mainly in elementary classes this approach should be involved necessarily for improving the achievement of students not only in mathematics to other subjects also.

## References


Bussama, K. 1993. The effect of simulation technique in the teaching of mathematics. *The Progress of Education*. 67(7): 151-154.

Chaudhari, U.S., S. Vaidya, N.G. Navalakha, and B.C. Mahapatra. 1999. Effect of synectics model (SM), gaming strategy and traditional method upon self-concept, creativity and achievement.*Perspectives in Education*. 15(1): 25-34.

Gupta, M., R.C. Hooda, and J. Kumar. 2001. Effect of quiz-gaming on learning of science at elementary level. *The Asian Journal of Psychology and Education*. 34(7-8): 13-16.

Jain, R. 1994. 'Effectiveness of activity-based teaching strategies using O.B. Science Kit'.Unpublished Master's Dissertation. RCE, Bhopal.

Manay, N.S., and T.C.S. Rani. 1998. Effect of puzzle programme in the development of cognitive and creative abilities among pre-school children. In Ved Prakash (ed.) *Studies on Learning Organization Community Participation and School Effectiveness at Primary Stage*, International Seminar. NCERT, New Delhi.

Meera, A. 2005. Learning centred education. In N. Sundar Raj and S. Francisca (eds.) *18th Annual Conference of All India Association for Educational Research as International Conference on Learning Centered Education*. St. Ignatius' College of Education, Palayamkottai.

Mishra, S. 1996. Traditional vs. competency-based teaching in environmental studies. *The Primary Teacher*. 21(3): 93-98.

National Policy on Education. 1986. *A report*. Government of India, MHRD. Department of Education. New Delhi.

Panda, B.N. 1996. Effect of activity-based teaching-cum-evaluation strategy on child achievement and retention. *Indian Educational Abstracts*. 6: 17-18.

Rama, D.V. (ed.) 1998. *Learning by doing*. American Association for Higher Education. Washington, D.C.

Rao, K.P. 1999. A study on the effectiveness of activity packs in teaching environmental studies II in improving the achievement levels of students. In K.K. Vashishtha (Co.) *Regional Seminar on Researches in School Effectiveness at the Primary Stage*. Regional Institute of Education. Mysore.

Reddy, G.L., and R. Ramar. 1995. Effectiveness of multimedia based modular approach in teaching mathematics to low achievers. *Journal of Higher Education*. 18(2): 283-288.

Sakhiya, R.B. 2005. A study of an effictiveness of co-operative language learning (CLL) in English language teaching. In *Regional Seminar on Review of National Curriculum Frameworks*. Regional Institute of Education. Bhopal.

Sharda, M. 1998. Activity-based teaching-learning strategies (ABTS) in a large-sized class at primary stage : A study. In Ved Prakash (ed.) *Studies on Learning Organisation Community Participation and School Effectiveness at Primary Stage*. International Seminar. NCERT. New Delhi.

Sujatha, K. 2005. Impact of activity-based teaching in biology for the low achievers in secondary grade. In Sr. N. Sundar Raj and Dr. S. Francisca (eds.) 1*8th Annual Conference of All India Association for Educational Research as International Conference on Learning Centered Education*. St. Ignatius' College of Educaion. Palayamkottai.

Vaughan, W. 2002. The effects of cooperative learning on the achievement in and attitudes towards mathematics of a group of 5th grade students of colour in a culture different from the United States. *The Journal of Educational Research*. 95(6): 601-607.