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A study of the effect of activity-based teaching on students' problem solving ability and academic achievement

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Abstract

The research conducted in the 8th-grade mathematics class comparing activity-based teaching with traditional teaching methods supports the notion that appropriate teaching methods have an impact on students' abilities, understanding, and achievement levels. The study found that activity-based teaching had a positive effect on students' problem-solving ability and academic achievement compared to the traditional teaching method. The use of an experimental and controlled group allowed for a comparison between the two teaching approaches. The experimental group received instruction through activity-based teaching, which emphasizes hands-on, experiential learning activities. On the other hand, the control group received instruction through traditional teaching methods, which typically involve lectures and rote memorization.

To measure the impact of the teaching methods, problem-solving ability tests and scholastic achievement tests were administered to both groups. Statistical calculations were then performed on the collected data to analyze and compare the results. The findings of the study demonstrated that students taught using activity-based teaching showed higher problem-solving abilities and academic achievement compared to those taught with traditional teaching methods. This suggests that the use of activity-based teaching facilitated qualitative development in education, emphasizing the importance of providing maximum opportunities for student-teacher interaction and utilizing appropriate educational techniques. It is important to note that this research provides evidence specifically in the context of the 8th-grade mathematics class. The results may not be directly applicable to other subjects or grade levels. Additionally, further research and replication of the study in different settings would contribute to the generalizability of the findings. In conclusion, the research supports the idea that activity-based teaching methods positively influence students' problem-solving abilities and academic achievement. These findings highlight the significance of employing effective teaching techniques that encourage student-teacher interaction and promote active learning to enhance educational outcomes.

Keywords: Activity-based teaching, problem solving ability, academic achievement

Introduction

Teaching-learning methods have an impact on the different abilities of the students. Appropriate teaching methods develop essential abilities, develop student understanding, and increase achievement levels. In the present research, the effect of activity based teaching method on problem solving ability and academic achievement has been studied. In class 8th, an experimental and controlled group was formed for teaching mathematics subject, the experimental group was taught activity based teaching and the controlled group was taught with traditional teaching method. The results were obtained by statistical calculation by administering problem solving ability test and scholastic achievement test. Based on the calculations, it has been found that activity based teaching has a positive effect on the adjustment ability and academic achievement of the students. Therefore, qualitative development in education is possible by providing maximum opportunities for student-teacher interaction by using proper educational techniques.

Powers are inherent in every person. When these powers get opportunities to flourish, then their development is according to their potential, but if this does not happen then their full development is not possible. Opportunities for the development of these abilities in children can be given by adopting appropriate teaching method according to the subject.

The effectiveness of teaching mathematics also depends on good teaching methods. Teaching methods make learning easy and simple. Teaching methods like planning, Dalton and Montessori etc. come under these teaching methods. While applying these methods in educational institutions, the principles of individual differences should be followed.

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As a result, proper environment will be available according to the need, interest, ability and ability of the child. This is necessary for the balanced and all-round development of the child.

Numerous studies have investigated the effect of activity-based teaching on students' problem-solving ability and academic achievement. Activity-based teaching refers to an instructional approach that emphasizes hands-on, experiential learning activities and encourages students to actively engage in solving real-world problems. Here are some findings from research in this area:

Improved Problem-Solving Ability: Activity-based teaching has been found to enhance students' problem-solving skills. By engaging in practical tasks, students are encouraged to think critically, analyze situations, and apply their knowledge to real-life scenarios. This approach allows students to develop problem-solving strategies, creativity, and the ability to work collaboratively. Several studies have shown that students exposed to activity-based teaching demonstrate improved problem-solving abilities compared to traditional instruction.

Enhanced Academic Achievement: Activity-based teaching can positively impact students' academic achievement. When students actively participate in hands-on activities, they develop a deeper understanding of concepts and retain information more effectively. Research has shown that activity-based teaching can lead to higher levels of knowledge retention, improved comprehension, and increased academic performance across various subjects, including mathematics, science, and language arts.

Increased Motivation and Engagement: Activity-based teaching often promotes active learning, which can enhance students' motivation and engagement. When students are actively involved in their learning process, they tend to be more interested and invested in the subject matter. This increased motivation can lead to a greater willingness to tackle challenges, persist in problem-solving, and explore alternative solutions. Consequently, students may experience a boost in their problem-solving abilities and academic achievement.

Development of Critical Thinking Skills: Activity-based teaching encourages the development of critical thinking skills, which are essential for effective problem solving. By engaging in hands-on activities, students are prompted to analyze information, evaluate evidence, make connections, and think independently. This approach fosters higher-order thinking skills, including analysis, synthesis, and evaluation. Research suggests that activity-based teaching can significantly improve students' critical thinking abilities, which, in turn, positively influences their problem-solving skills and academic achievement.

Collaborative and Social Skills: Activity-based teaching often involves cooperative learning and group work, promoting the development of collaborative and social skills. Through teamwork and communication, students learn to share ideas, listen to others, negotiate, and solve problems collectively. These skills are not only crucial for problem solving but also valuable for future academic and professional endeavours.

It's important to note that the effectiveness of activity-based teaching may vary depending on factors such as the nature of the activities, teacher facilitation, student characteristics, and the subject matter. Additionally, implementing activity-based teaching requires appropriate resources, planning, and support from educators. Nevertheless, research generally indicates that incorporating activity-based teaching strategies can have a positive impact on students' problem-solving ability and academic achievement.

Objectives of the study

The following objectives have been set for the present research study

1. To find out the effect of activity-based teaching on the problem solving ability of the students.
2. To know the effect of activity-based teaching on the academic achievement of the students.
3. To do a comparative study of the academic achievement and problem solving ability of the students.
4. To know the problem solving ability of children of different academic achievement levels.

Hypothesis

1. There will be no significant difference in the academic achievement of the students of the experimental group and control group.
2. There will be no significant difference in academic achievement on the basis of gender in the students of experimental group and control group.
3. There will be a significant difference in the academic achievement of pre-test and post-test students of the experimental group and the controlled group.
4. There will be no significant difference in the problem solving ability of the students of experimental group and control group.
5. There will be no significant difference in pre-test and post-test results (in terms of problem solving ability) of the students of experimental group and control group.

Research Process - Experimental Method -

For research work, 50 boys and 50 girls were divided into two groups of 25-25 respectively. In these, one group of 50 students (25 boys + 25 girls) was made experimental and the other a control group of 50 was formed.

50 students of the experimental group were taught Mathematics subject of class 8th by the researcher through various educational activities. Teaching was done through lesson plan, using pictorial solution etc. related to prescribed activities, before and after teaching, problem solving ability of experiment group and controlled group was tested and measurement of educational achievement was done through scale.

Teaching to 50 students of the controlled group was done by the researcher himself in the traditional method. This teaching remained teacher centered. Scholastic achievement test (pre and post) and problem solving ability test were administered to all these students.

Sample

As a sample in the present study, 100 students (50 boys and 50 girls) of class 8 of upper primary level of s school from Kanpur Dehat have been selected by random method.

Tools

Problem Solving Ability Test: Constructed by – Mr. L.N. Dubey, Publication Year – 1971, National Psychological Corporation, Agra It was administered on experimental and controlled group students.

Self-made Scholastic Achievement Test

Multiple choice and daily life related questions were included by the researcher for the academic achievement test (pre-teaching and post-teaching) from the Mathematics subject of class 8th. There were 25-25 posts in the

achievement test (pre and post) and the time was kept for 1.30 hours.

Statistical operations

Hypothesis Number - 01

There will be no significant difference in the academic achievement of the students of the experimental group and the control group (in terms of post-testing).

The calculation with respect to the above hypothesis is as follows:

Table 1: Tabulation of academic achievement of the students of the experimental group and the control group

Sr.	Sample group	N	M	S.D.	S.Em	Combined S.E m	df	t-Value	Significance
1	Experimental	50	32.26	7.10	1.00	1.582	98	4.33	0.01 % significance
2	Controlled	50							

Explanation: It is clear from the observation of the table that the mean of the experimental group (32.26) is higher than the mean of the control group (25.4). "t-value test" was used to check the significance. The value of t obtained from the test was 4.33, which is higher than the tabulation value at 0.01 level of confidence, that is, a significant difference was found in the academic achievement of the students when teaching work was done by "activity-based teaching method" and "traditional teaching method". Hence hypothesis – 01 is rejected.

Hypothesis Number - 02

"There is no significant difference in academic achievement

between the experimental group and the control group on the basis of gender."

Explanation: To test the above hypothesis, by dividing the scores of the test done in Hypothesis-01 separately into the scores of boys and girls, finding the parallel mean (X) and standard deviation (σ) of the educational achievement of the children, the significance is determined. "t-value test" was calculated for the test. The above procedure was administered separately on boys and girls of "experimental group" and "controlled group".

The calculation with respect to the above hypothesis is as follows -

Table 2: Tabulation of academic achievement between the experimental group and the control group on the basis of gender

Testing	Group	Gender	N	Mean(x)	S.D.(σ/√N)	df	Calculated t-Value	t- Value	Significance
Achievement by Gender	Experimental	Boys	25	33.12	6.26			2.68	Not significant
		Girls	25	31.92	7.8	48	0.6	at (0.01)	
	Controlled	Boys	25	24.8	9.21			2.68	Not significant
		Girls	25	26	8	48	0.2	at (0.01)	

It is clear from the observation of the table that (1) in the experimental group, the average score of the boy class (33.12) is higher than the average score of the girl class (31.92). "t-value test" was used to check the significance. The t-value of 0.6 was obtained from the test, which is less than the tabulation value at 0.01 level of confidence, that is, no significant difference was found in the academic achievements of Mathematics subject on the basis of gender in the experimental group.

II. In the controlled group, the average score (24.8) of the boys' category is lower than the average score (26) of the girls' category. "t-value test" was used to check the significance. The value of t-test was found to be 0.20, which

is less than tabulation value at 0.01 and 0.05 level of confidence, that is, there is no significant difference between gender in the control group and academic achievement of maths subject. No significant difference was found in achievement.

Hence hypothesis-02 is accepted.

Hypothesis Number - 03: "There is a significant difference in the academic achievement of pre-test and post-test students of experimental group and control group."

The calculation with respect to the above hypothesis is as follows -

Table 3: Tabulation of academic achievement of pre-test and post-test students of experimental group and control group

Sr.	Group	Testing	N	Mean (x)	S.D. (σ/√N)	S.Em	df	Calculated t-Value	t- Value	Significance
1	Experimental	Before	25	24.7	7.26	1.45	48	18.66	2.68	Significant
		After	25	32.26	7.10	1.42				
2	Controlled	Before	25	20.7	8.68	1.73	48	9.61	2.68	Significant
		After	25	25.4	8.65	1.73				

It is clear from the observation of the table that the mean of academic achievement of the experimental group is 24.7 and 32.26 respectively in terms of pre-test and post-test, which

is higher than the pre-test mean of post-test. "t-value test" was used to check the significance. The test yielded a value of t (18.66) which is higher than the tabulation value at 0.01

level of confidence. That is, a significant difference was found in the academic achievement of the students in the subject of mathematics in the context of pre- and post-test when teaching was done by activity-based teaching in the experimental group.

It is clear from the observation of the table that the mean of the educational achievement of the controlled group is 20.7 and 25.4 respectively in terms of pre- and post-test, which is higher than the pre-test mean. "t-value test" was used to check the significance. The value of t obtained from the test is 9.61, which is higher than the tabulation value at 0.01 level of confidence, that is, the mathematics subject of

students in the context of pre- and post-test when teaching work was done by "Activity Based Teaching Method" and "Traditional Teaching Method". A significant difference was found in the academic achievement of Hence hypothesis – 03 is accepted.

Hypothesis Number-04: "There is no significant difference in problem-solving ability of experimental and control group students."

The calculation with respect to the above hypothesis is as follows -

Table 4: Tabulation of problem-solving ability of experimental and control group students

S. No	group	N	Mean (x)	S.D.	S.Em (σ/\sqrt{N})	df	Calculate t-Value	t-Value	Significance
1	Experimental	50	12.38	1.83	0.5244	98	2.365	2.63 /0.01 and 1.98 / 0.05	Significant
2	Controlled	50	11.14	2.53	0.357				

Explanation – It is clear from the observation of the table that the mean of problem solving ability of the experimental group is (12.38) and the mean of problem solving ability of the control group is (11.14). "t-value test" was used to check the significance. From the test, the value of t-value was 2.365, which is higher than the tabulation value at 0.05 level of confidence i.e. by "Activity Based Teaching Method" and "Traditional Teaching Method". A significant difference was found in the problem solving ability of the

students in mathematics subject after the teaching work was done.

Hence hypothesis – 04 is rejected.

Hypothesis Number 05: "There is no significant difference between pre-test and post-test results (in terms of problem solving ability) of experimental and control group students." The calculation with respect to the above hypothesis is as follows –

Table 5: Tabulation of pre-test and post-test results (in terms of problem solving ability) of experimental and control group students

Sr. No	Group	testing	N	Mean(x)	S.D.	S.Em (σ/\sqrt{N})	df	Calculate t-Value	Significance
1	Experimental	Before	50	12.38	1.83	0.258	98	3.861	Significant
		After	50	13.72	1.64	0.231			
2	Controlled	Before	50	11.14	2.53	0.357	98	0.588	Significant
		After	50	10.86	2.23	0.315			

It is clear from the table that The parallel mean of pre-teaching test of problem solving ability of experimental group students was 12.38 and the parallel mean of post-teaching test of problem solving ability of same group students was found to be 13.72. It shows that the post-teaching problem solving ability test score is higher than the pre-teaching problem solving test score for this group. "t-test" was done to check the significance, whose value was found to be 3.861, which is higher than the tabulation value at 0.01 level of confidence, that is, there is a significant difference.

So the hypothesis – 05 is rejected for the experimental group.

The parallel mean of pre-teaching test of problem solving ability of control group students was 11.14 and the parallel mean of post-teaching test of problem solving ability of same group students was found to be 10.86. It shows that the post-teaching problem solving ability test scores are lower than the pre-teaching problem solving test scores for this group. "t-value" test was done to check the significance, whose value was found to be 0.588, which is less than the tabulation value at 0.01 level of confidence, that is, there is no significant difference. Therefore, hypothesis – 05 is accepted for the controlled group.

Conclusion

The following conclusions were obtained from the statistical analysis of the data collected in the presented short research:

1. The academic achievement of the experimental group was found to be higher than the students of the control group.
2. In the experimental group and the controlled group equality was found in the educational achievement of boys and girls on the basis of gender.
3. The level of academic achievement was found to be higher in the post-test than in the pre-test of Mathematics subject in the students of the experimental group.
4. The problem solving ability of the students of the experimental group was found to be higher than that of the students of the control group.
5. Problem solving ability of experimental group students was found to be higher after activity based teaching.

Suggestions

- Maximum use of those teaching methods/methods in classroom teaching work, in which children have active participation.
- Child's thoughts are creative and imaginative. Each object has its own approach in its use and construction. Therefore, the teacher should show the right direction by understanding the mood of the child, by giving proper guidance and encouragement.
- To explain the basic concept and operation of mathematics, the teacher should set up a mathematics laboratory in his school.

- Use problem solving methods in classroom teaching process. Children themselves solve the problems under the guidance of the teacher. What, why and how to develop logical reasoning ability? Conceptual questions should be used in the class.

References

1. Aziz, Talat. A study of comparative effectiveness of the information processing models of teaching in developing certain concepts in chemistry at the Secondary Stage Ph.D. Education V Survey of Education Research; c1990, 2.
2. Goel VP, Agbebim LA. Learning Physics through lecture demonstration method (L.D.M.) and individualized instruction method (IIM) Indian Education Review. 1990;25(4):84-89. (S.pr.1404) Pp-1238s
3. Hasnine MS, Nurul Habib K. Tour-based mode choice modelling as the core of an activity-based travel demand modelling framework: a review of state-of-the-art. Transport Reviews. 2021;41(1):5-26. <https://doi.org/10.1080/01441647.2020.1780648>
4. Kurniasih AW, Hidayah I, Asikin M. Exploring the elementary school's teacher's perception of students 'mathematical thinking in mathematics teaching. Journal of Physics: Conference Series. 2021;1918(4):042069. <https://doi.org/10.1088/17426596/1918/4/042069>
5. Iqbal MN, Kütt L, Lehtonen M, Millar RJ, Püvi V, Rassölkkin A, *et al.* Travel Activity Based Stochastic Modelling of Load and Charging State of Electric Vehicles. Sustainability. 2021;13(3):1550. <https://doi.org/10.3390/su13031550>
6. Landmann S, Baumgarten L, Bornholdt S. Self-organized criticality in neural networks from activity-based rewiring. Physical Review E. 2021;103(3):032304. <https://doi.org/10.1103/PhysRevE.103.032304>