EFFECT OF INNOVATIVE PEDAGOGY ON LEARNING OUTCOMES OF GRADE FIVE STUDENTS IN MATHEMATICS

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ABSTRACT

In India mathematics is a compulsory subject in the school curriculum in early grade and due to various reasons, the learning outcome of school students has mostly been less than satisfactory for a long time in the recent past. The present study tried to explore the role of innovative pedagogical teaching style in achieving learning outcomes in mathematics for grade five students as grade five students' understanding of mathematical concepts lays the foundation for further academic success. The sample consisted of N=60 students of grade 5 and the results indicated significant difference in learning outcome of students of the experimental and control groups in mathematics.

***Keywords**: Innovative pedagogy, learning outcome.*

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INTRODUCTION

Traditional teaching methods often focus on rote memorization and procedural fluency, neglecting critical thinking, problem-solving, co-operative learning and collaboration whereas Innovative pedagogy, integrating knowledge and student-centered approaches, has the potential to transform mathematics education at school level.

Teaching mathematics in an innovative pedagogical way is not only concerned with the computational know-how of the subject but is also crucial in achieving the learning outcome of

the mathematical content and process leading to its better understanding and application of the concepts. Teaching mathematics one should use the teaching Methods, strategies and pedagogic resources that are much more fruitful in gaining adequate responses from the students than we have ever had in the past. Kundu A.(2023), studied various innovations in Teaching Mathematics to strengthen mathematical understanding of school students and used multi- dimensional innovative pedagogy methods (Inductive -to-Deductive Method, Analytic to- Synthetic Method, Problem- Solving Method) that were supposed to make the teaching-learning processes of mathematics interesting and effective. He found significant improvement on the learning outcome of students taught through innovative ways. Chigbu, Ngwevu and Jojo (2023) studied the effectiveness of innovative pedagogy in a new educational ecosystem with diversified innovative pedagogy practices that engaged with ethical and flexible learning rather than replicating unsustainable and static teaching and learning strategies that struggled to complement. They also found significant improvement in students' learning outcome. Chaurasia (2020) surveyed Mathematics Education In India: Retrospectives and Perspectives and tried to explain how some major topics like number system, percentages, algebra, geometry are taught by teachers found effective by the students and schools. He found that across all regions of the country, it required high quality of innovation and content mastery for teaching mathematics at elementary grades, particularly algebra as it is the most abstract in nature as compared to others. Rahmadi and Lavicza (2021) studied Pedagogical Innovations in Elementary Mathematics Instructions: Future Learning and Research Directions and explored the methodically reviewed pedagogical innovations in mathematics learning in Indonesian elementary schools and found significant increase in scores of students taught through innovative techniques. Khan (2018), analyzed the gist of Innovation in Mathematics Teaching and tried to explore the important information on various innovating teaching methods or systematical procedures like Inductive and Deductive, the analytic and the Synthetic, laboratory, problem-solving, project methods and the play way method used by the school teachers for effective attainment of learning goals in mathematics. He also found a positive impact of innovative techniques of teaching on the learning outcome of students.

Astrero (2023) investigating the impact of Improving the Performance of Grade 5 Learners in Mathematics Using Problem-Based Learning Approach used the problem-based lesson in play-way method help students develop critical and creative thinking and found that innovative pedagogy plays a prominent role in enhancing the learners' critical and creative thinking skill.

The rationale for this study lies in the suboptimal mathematics performance of grade five students, which hinders their future academic success. Traditional teaching methods often fail to engage students, leading to disinterest and poor understanding. The integration of technology and innovative pedagogy has the potential to enhance mathematics learning, support cognitive development, and foster problem-solving, critical thinking, and collaboration skills. Furthermore, present study is in line with educational policy 2020 for teachers' professional development and may contribute to the body of knowledge on innovative pedagogy in mathematics education.

STATEMENT OF THE STUDY: Effect of innovative pedagogy on learning outcomes for grade five students in mathematics

OBJECTIVES OF THE STUDY

The study has been conducted to achieve the following objectives:

1. To find out the difference between the effectiveness of innovative pedagogy techniques over the conventional method of teaching.

1. To find out the impact of innovative pedagogy on the learning outcomes of female students of experimental group and the control group.
2. To find out the impact of innovative pedagogy on the learning outcomes of male students of experimental group and the control group.

HYPOTHESES OF THE STUDY

1. There is no significant difference between the effectiveness of innovative pedagogy techniques over the conventional method of teaching.

2. There is no significant difference in the attainment of learning outcomes of Female students of experimental group and the control group.

3. There is no significant difference in the attainment of learning outcomes of Male students of experimental group and the control group.

OPERATIONAL DEFINITIONS

The Operational definitions of technical terms are as follows:

INNOVATIVE PEDAGOGY :Innovative pedagogy encompasses creative and non-traditional teaching methods designed to enhance student engagement, understanding, and skill development. In the present study innovative pedagogy encompasses following approaches:

- Activity-Based Learning: Students engage in different types of activities like oral, written, with material, single, small group, large group etc. that require applying knowledge to solve real-world problems, promoting collaboration, healthy competitive spirit , critical thinking etc.
- Game-Based Learning: Incorporates educational games to make learning engaging, allowing students to learn through play and experimentation.
- Project-Based Learning: Encourages students to work together in groups to complete tasks or specific projects, enhancing communication teamwork skills etc.

LEARNING OUTCOMES FOR GRADE FIVE MATHEMATICS: These are the detailed specifications of the competencies and skills that Class 5 students are expected to acquire to enhance their understanding of numbers , money and measurement as per NCERT, New Delhi guidelines.

Methodology and Design of the study:

Research Design: Researchers have used True **Experimental Design (Two Groups Randomized Matched Subjects post-test Only Design) in which** innovative pedagogy was independent variable and learning outcomes was dependent variable.

Sample: 60 students of grade five from 02 schools in Siwan Sadar block only.

SAMPLING DESIGN: Researchers used purposive sampling technique for this study.

Table 1

Experimental Design

Randomly assigned group After matching	**Number of students**	**Method of teaching (Independent Variable)**	**Post-test**
Experimental group	30	Teaching by Innovative Pedagogy	Post Test (T2)
Control group	30	Teaching by Conventional Method	Post Test (T2)

Tool: Researchers used learning outcomes based Achievement test (LOBAT) for grade five Mathematics in this study.

SAMPLE OF THE STUDY

The sample for the present study consisted of 60 primary school students of grade five from 02 schools in Siwan Sadar block only. Out of 60, 30 were male and 30 were female students.

TOOLS USED IN THE STUDY

Following tool has been used for data collection in the present study

1. Learning Outcome based Achievement test (LOBAT) for grade five mathematics (developed by the investigators)

STATISTICAL TECHNIQUES USED

Following statistical techniques has been used for analyzing and interpreting the data:

1. Descriptive statistics (such as mean, median, S.D., Skewness and Kurtosis) was computed to study the nature of distribution of scores for all the variables.
2. Simple, Partial and multiple correlations were computed in order to estimate the degree of correlation of the variables.
3. Significance of difference of means or t-test was used to find out the significance of difference in means of the relevant variables for different category of teachers based on their sex and locale.

DATA ANALYSIS, INTERPRETATION AND RESULTS

Data was collected; scores of academic achievement were tabulated and interpreted in the light of the following hypothesis.

Hypothesis 1: There is no significant difference between the effectiveness of innovative pedagogy techniques over the conventional method of teaching.

Table-2

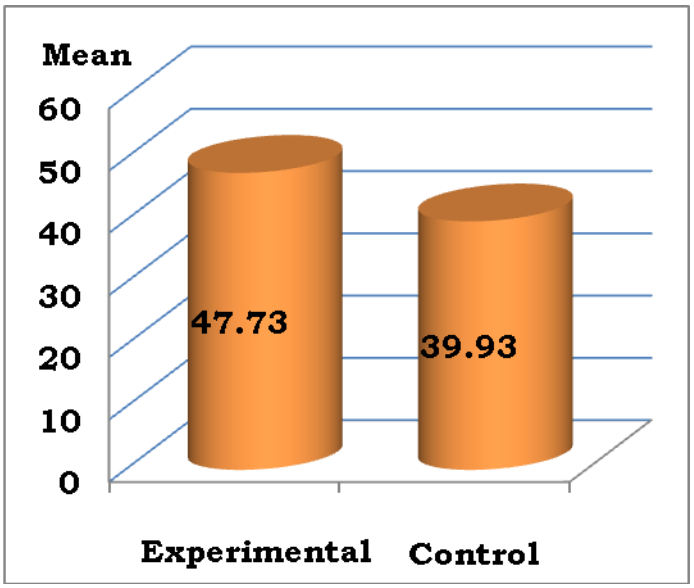
Academic Achievement of Students of Experimental Group and Control Group

Method of Teaching	N	Mean	SD	SE_D	t- Value	Remark
Innovative Pedagogy	30	47.73	5.98	1.56	4.77	Significant
Conventional Method	30	39.93	6.09			

*Significant at 0.01 level of significance

*Table value at 0.01 level of significance = 2.66

Figure-1: Graph showing mean difference of the academic achievement of students of Experimental group and Control group.



INTERPRETATION

Table 1 shows academic achievement of group of students exposed to conventional method and those students taught through *Innovative Pedagogy* in mathematics. The mean score of the Experimental group (47.73) is higher than the mean score of Control group (39.93). The mean difference is 7.80 which shows that the academic achievement of Experimental group is higher than that of Control group. Further the t-value is 4.77 which is higher than the table value (2.64) thereby significant at 0.01 level. This indicates that there is significant difference between the two groups in their academic achievement in Mathematics. It can be concluded that the group of students exposed to *Innovative Pedagogy* shows higher performance than students taught through conventional method. Hence, hypothesis no. 1 thus rejected.

CONCLUSION

1. There exists a significant difference in the academic achievement of the students when taught through two different methods of teaching. The mean score of the academic achievement of students exposed to Innovative Pedagogy is higher than mean score of students taught through Contemporary Method of teaching. This reflects that the academic achievement of student in mathematics is higher in learning exposed to Innovative Pedagogy than the contemporary Method of teaching.

DELIMITATIONS OF THE STUDY

Since the study was conducted on a small sample size, therefore the findings may suffer from broad generalizations. The study was also limited to one town of one district only. It should have covered other cities as well. Self made achievement test was used by the investigator. So many discrepancies may be found in the results in absence of standardized achievement test for the study. Academic achievement of students also got affected by the school environment and other related factors.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are put forward:

1. It is recommended that teacher should use Innovative Pedagogy methods for teaching Mathematics in primary classes so that students can easily understand the various concepts of Mathematics.

2. Investigator recommended that training for teaching various aspects of Innovative Pedagogy should be given to teachers on regular basis.

3. This study may prove beneficial in suggesting teachers the more effective methods for teaching mathematics at primary level.

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