ORIGINAL RESEARCH PAPER

EDUCATION

EFFECTIVENESS OF COOPERATIVE LEARNING IN ENHANCING MATHEMATICAL INTEREST

KEY WORDS: Cooperative learning (CL), Interest, Mathematics Education

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ABSTRACT

Mathematics is often perceived as difficult, leading to high student disinterest. This study examines the effectiveness of cooperative learning (CL) in enhancing students' interest in mathematics in a sample of 24 class eight students of a private CBSE school. A single-group pre-test post-test experimental design was adopted. The Interest Inventory by L.N. Dubey was used to measure interest before and after the intervention of 20 days of teaching through CL. Mean scores and t-values indicated a significant increase in students' interest in mathematics. The intervention was equally effective for both high and low achievers. These findings establish the potential of CL as an effective pedagogical tool to make mathematics more engaging, fostering positive attitudes and sustained interest in the subject. CL aligns with the National Education Policy (NEP) 2020 goals by promoting interactive, student-centered teaching and developing critical thinking and collaborative skills.

INTRODUCTION

Mathematics is one of the core subjects taught in schools because its principles and applications form the foundation for various scientific disciplines, making it a prerequisite for learning other sciences. It's a paradox that the students are disinterested in this very important subject. Generally speaking, many students see math as a difficult, boring subject. making the achievement of the learning objectives very challenging. Hence, the student's general lack of interest in this pure science must be addressed through student-centered teaching-learning methods that are engaging and make learning interesting.

Based on Piaget's (1973) constructivist approach and Vygotsky's social learning approach (1978), CL is considered an answer to the problem of teacher-centred learning, where students are just passive listeners surviving in an exam-oriented, highly competitive environment. With "cooperation" identified as one of the 21st-century skills, the Indian education system cries for innovative teaching methods that enhance cooperation in future citizens.

Though the research overwhelmingly supports the effectiveness of cooperative learning in improving the academic and social outcomes of schooling, these outcomes differ according to gender, student level, and social structure. The present study aimed to understand the effect of CL on interest in mathematics for middle school students of class eight.

Literature Review

Numerous studies have highlighted the importance of 'interest' in students' achievement. "Interest," wrote Decroly, " is the sluice gate, by means of which the reservoir of attention is opened and directed ." (Hamaide, 1925) The 'sluice gate' implies that interest controls or restricts access to knowledge and understanding, much like a sluice gate manages the water flow. High interest opens the gate, allowing knowledge to flow freely, whereas low interest closes it off, potentially blocking learning. This alludes to the importance of fostering student interest. The Decroly teaching method emphasizes the child's interests and needs as the starting point for learning.

Cronbach (1963) confirmed a positive correlation between 'interest in mathematics' and mathematics achievement. Hidi (2011) stated that "our interest usually determines our preference in processing certain types of information. Our interests can also affect our cognitive functions and learning." She proposed that the psychological and physiological processes differ hugely based on whether or not the information received is interesting. Interest in a particular area is important in successful learning and advanced achievement (Fisher et al.,2012; Harackiewicz et al., 2008; Hidi and Renninger, 2006). Students who are interested in their learning activities are likely to report high competence beliefs (Marsh, Trautwein, Ludtke, Koeller and Baumert, 2005), high achievement levels (Koeller, Baumert and Schnabel, 2001) and choose high school courses that correspond to their interests (Watt et al., 2012). A recent study by Ameyaw and Mante (2025) indicated that role-play as a teaching strategy provides a viable experiential learning opportunity that considerably influences students' interest in the teaching and learning of photosynthesis.

These results establish the importance of interest as a determining factor for learning to take place, indicating that a teacher should try to inculcate sufficient interest in his/her classroom teaching so that the subject of mathematics may not be treated as dull, tiresome and difficult.

Instructional strategies are among the most important factors influencing students' mathematical interest in schools (Abid et al., 2023). Traditional teaching approaches, which rely heavily on direct instruction and individual learning, may not always cater to diverse learning needs or foster deeper conceptual understanding. The National Education Policy (NEP) 2020 advocates for interactive, inquiry-based learning methods that promote conceptual understanding and teamwork. Overwhelming evidence exists that CL has increased engagement and achievement in mathematics classes (Slavin, 1995). Moreover, CL promotes cognitive learning and emotional and social skills, essential for students' overall growth (Gillies, 2016). Boaler (2015) reported that CL enhances students' mathematical reasoning and understanding. Similarly, Kumar (2020) established that CL aligns with the NEP 2020's call for student-centered, inquiry-based, and experiential learning methods. However, few studies have been conducted to find ways to develop mathematical interest in students so far. Thus, there is a great need to study the effect of various instructional strategies like CL to find solutions for students' disinterest in mathematics and, consequently, students' lack of achievement in mathematics. Given this educational shift, exploring whether cooperative learning can effectively increase students' interest in mathematics is essential. This experimental study provides empirical evidence on the role of cooperative learning in fostering mathematical interest. By examining the impact of a structured 20-day cooperative learning intervention on class eight students, the study offers valuable insights for educators, curriculum developers, and policymakers on implementing engaging, student-centered

instructional strategies like CL to improve mathematics education.

Statement of the Problem

Effectiveness of Cooperative Learning in Enhancing Mathematical Interest.

Objectives

1. To check the effectiveness of CL in enhancing students' Mathematical interest.
2. To compare the effectiveness of CL in enhancing the Mathematical interest of high and low achievers.

Hypotheses

1. H01: There is no significant difference between the students' pre-treatment and post-treatment scores of mathematical interest.
2. H02:There is no significant difference between the gain in Mathematical interest of high and low achievers.

Method

Experimental Method was chosen for this research study.

Variables

1. **Independent Variable.** Cooperative Learning strategy employed by the researcher.
2. **DependentVariable:** Students' mathematical interest.

Research Design

The single group pre-test post-test design, known as the pre-experimental design, was adopted for the study.

O1	X	O2
Pre-test	Treatment or Intervention	Post-test

Figure 1: Pre-experimental Research Design

Sample

A non-probability purposive sampling technique was used to select the school. An intact section of 24 class eight students in the age group 13-15 years were chosen for the study. The students were divided into 6 mixed ability heterogeneous groups of 4 students each, such that each group has one high achiever, two average achievers, and one low achiever.

Tool

The Mathematical Interest Inventory, developed and standardized by L.N. Dubey, was used to measure the level of interest in mathematics.

Data Analysis and Inferences

Statistical analysis was done. Mean, SD, t-test (difference method) suitable for small groups, and MWU test were used for data analysis to compare gains between high and low achievers.

Table 1: Hypothesis 1

N	$\sum D$	M_D	$\sum x^2$	SD_D	SE_D	t_{cal}	Significance	Inference
24	144	0.6	228	3.14	0.642	9.33	Significant at 0.01 level	H_{o1} Rejected

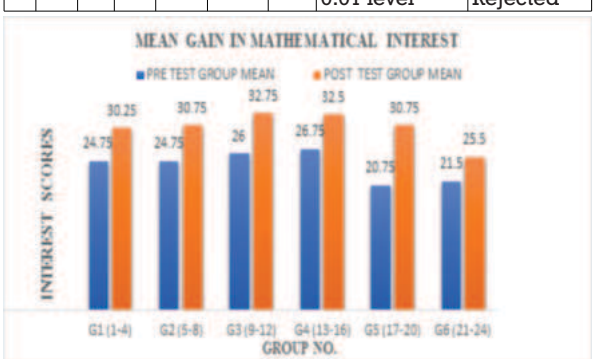

Figure 2: Mean Gain in Mathematical Interest

The t-test (difference method), which is suitable for small samples (N<30), was used to test the null hypothesis H01. The calculated t-value (9.33) is greater than that given in the table(2.81) at 0.01 significance level for the degrees of freedom N-1=23.

Therefore, a significant difference is observed between students 'mathematics interests' after the intervention. The null hypothesis, "There is no significant difference between the students' pre-treatment and post-treatment scores of mathematical interest," is thus rejected.

Table 2: Hypotheses 2

No. of High Achievers	No. of Low Achievers	Ucal	Pro-bability	Significance	Inference
N1 = 6	N2 = 6	10.5	P=2 (0.12) = 0.24	In-significant for α=0.05	Ho2 Accepted

The non-parametric Mann-Whitney U-test was used to test the null hypothesis(H02). The test is appropriate as the sample groups to be compared are very small and assumed to be independent. U ≤10 When N1=N2=6, has the probability of occurrence under the H02 of p=0.24 for a two-tailed test. Thus, the data does not give evidence that would justify rejecting H02 at a 0.05 level of significance. The hypothesis, "there is no significant difference between pre and post-treatment scores of mathematical interest of high and low achievers," is accepted.

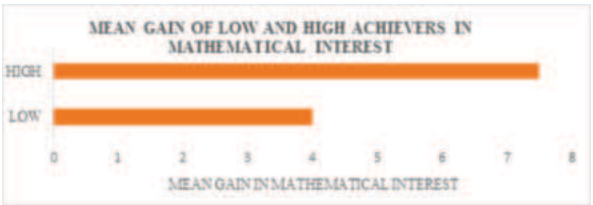

Figure 3: Mean Gain of High and Low Achievers

Major Findings

1. Significant gain in mathematical interest shows that the CL strategy is useful in enhancing Mathematical Interest.
2. CL is equally effective in enhancing the mathematical interest of high and low-achieving students.

Suggestions for Further Study

1. The. scope of the study can be extended to subjects other than mathematics.
2. Studies could be conducted to compare and analyze other teaching methods or various CL methods to increase interest levels.
3. Longitudinal studies can be conducted to track the long-term impact of CL on other variables like academic performance, socio-emotional development, and overall well-being of students of different grade levels. This can provide insights into the sustained effects of CL over time.
4. Investigate whether there are significant differences in the gains in interest of various demographic groups, such as gender, socioeconomic status, and academic performance. Understanding potential disparities can guide targeted interventions.

Educational Implications of the Study

Emphasis on the Learning Process. The findings of this study indicate that the learning process plays a significant role in developing students' interest in mathematics. This suggests that educators should focus on student engagement and motivation quality during the learning process.

Pedagogical Decisions Should Prioritize Interest Development. The study highlights the importance of integrating such interactive strategies into regular instructional practices that promote student interaction,

exploration, and shared problem-solving to sustain students' interest in mathematics.

Differentiated Instruction Benefits. The study found that both high and low-achieving students benefited from cooperative learning, albeit in different ways. High achievers reinforced their understanding by explaining concepts to their peers, while low achievers gained confidence and comprehension through peer-assisted learning and group discussions. This indicates that cooperative learning can be a natural form of differentiated instruction, catering to diverse learning needs within the same classroom.

Implications For Curriculum and Assessment. Given the success of cooperative learning in enhancing student interest, mathematics curricula should incorporate structured collaborative activities as a core instructional approach rather than an optional strategy. Additionally, assessment methods should be adapted to measure engagement, problem-solving approaches, and teamwork skills rather than focusing solely on individual written tests.

Teacher Training and Professional Development. The study underscores the need for professional development programs that equip teachers with the skills to implement cooperative learning effectively. Training should focus on strategies for group formation, facilitation of discussions, and assessment of collaborative learning outcomes.

CONCLUSION

This study reinforces that cooperative learning is an effective pedagogical approach for enhancing students' interest in mathematics. It establishes CL's transformative capability to change the landscape of mathematics education for the better. It calls on the stakeholders to adopt CL into teaching practices, curriculum design, and teacher training programs for its ability to foster a conducive learning environment that supports students' engagement and enthusiasm towards and interest in mathematics.

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