

Effectiveness of Cooperative Learning in Mathematics of ESL Students

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Abstract:

This research investigates the effectiveness of cooperative learning strategies in improving mathematical proficiency among English as a Second Language (ESL) students. A mixed-methods approach was employed, integrating quantitative analysis of pre- and post-test scores with qualitative insights from student feedback and observations. Results indicate a significant enhancement in mathematical understanding and problem-solving skills among ESL students who engaged in cooperative learning activities. Collaborative tasks facilitated language acquisition, fostered peer interaction, and promoted a supportive learning environment conducive to academic growth. Moreover, cooperative learning encouraged active participation and engagement, mitigating language barriers and enhancing comprehension of mathematical concepts. These findings underscore the potential of cooperative learning as a valuable pedagogical tool for promoting mathematical proficiency and language development among ESL students, offering insights for educators seeking inclusive and effective instructional strategies in diverse classroom settings.

Introduction

India boasts a rich mathematical heritage dating back to the Vedic period, with contributions transmitted globally. However, during the British colonial era, the imposition of English in education led to a decline in traditional Sanskrit-based mathematical education. This decline persisted post-independence, exacerbated by a focus on engineering and a separation of teaching and research. Despite India's historical role in mathematical innovations like the invention of zero, its mathematical education has suffered. To address this, modern teaching methods such as cooperative learning are being explored.

This experiment aims to apply cooperative learning specifically to ESL students, acknowledging the need for innovative approaches to revive mathematical education in India. By embracing methods like hands-on learning, visuals and collaborative problem-solving, there's potential to reinvigorate mathematical learning and restore India's mathematical legacy.

Review of Literature

A review of related literature (RRL) is a detailed review of existing literature related to the topic. The component of the study reveals teacher perceptions of learner attitudes and the reasons for low achievement. Learner perceptions of themselves are diagonally opposite in nature to teacher perceptions of learners.

(Aruna C: Empowerment through motivation in ESL A Study of Urban Regional Medium Girl Students at Tertiary Level. 2003)

It was found that the subjects exposed to cooperative learning method (TGT) achieved higher on achievement test in comparison to those exposed to traditional method of teaching. It was found that the subjects exposed to cooperative learning method (TGT) achieved significantly higher mean gain score of achievement in comparison to that in the traditional method. (Sarita: Effect of cooperative learning on academic achievement academic anxiety and social competence of high school students (2014).

A significant difference was found in the achievement of class VIII students in Mathematics taught through Metacognitive Strategies with suitable metacognitive instructions and those taught through conventional method.

(Bhuvaneshwari: Effect of Cooperative Learning and Metacognitive Strategies on Mathematics Achievement of Class VIII students Operational Definitions. (2018)

Present study shows that the Cooperative Learning Strategy is significantly more effective compared to Conventional Approach in improving the Achievement in Mathematics, developing positive Attitude towards Mathematics and enhancing Perceived Self Efficacy among secondary students. (Pallavi Dongre: Effect of Cooperative Learning Strategy on Achievement in Mathematics Attitude towards Mathematics and Perceived Self Efficacy of Secondary School Students (2019)

The cooperative learning intervention was proved by increasing Achievement in Mathematics of the secondary school students by considering Intelligence Quotient scores (Shalini Rao: Effectiveness of corporative learning strategy on achievement in mathematics and interpersonal relationships of secondary school students (2019)

Recommendations include integrating mathematics methods courses into ESL teacher education programs and promoting reflective teaching practices among educators to foster meaningful mathematical learning. This research offers valuable insights for ESL teacher preparation, teacher training programs, and future research in mathematics education (Susana Davidenko: Learning mathematics in English: ESL and non-ESL students' perspectives (2000)

Study suggests that cooperative learning methodologies are well-received and beneficial for ESL students in enhancing their learning experience, comprehension, and interaction within the classroom setting. (Thilaga Ravinthar, Khursiah Mohammad Sauffi, Nur Qistina Abdul Razak say (Conference paper): A Study on Students' Perspective towards Cooperative Learning in the ESL Classroom (2022)

Objectives

1. To determine whether cooperative learning strategies enhance the academic performance of ESL students in mathematics.
2. To examine the impact of cooperative learning on language acquisition and communication skills among ESL students within the mathematics context.
3. To investigate how cooperative learning experiences in mathematics contribute to ESL students' socio-emotional well-being, including their sense of belonging, confidence in mathematical abilities.
4. To explore the role of cooperative learning in promoting inclusive and culturally responsive mathematics classrooms

Methodology

The researcher had used Experimental research method to conduct the research. Experimental research, also called experimentation, is research conducted using scientific approach using two or more variables. The first variable is a constant that the researcher can manipulate to see the differences in the second

variable. Most of the studies in the quantitative research methods are experimental in nature. Two types of variables are used by the researcher. Independent and dependent variable. The dependent variable gets affected due to the change in independent variable. The independent variable used by the researcher in this research was cooperative learning and the dependent variable was effectiveness shown by the students in the achievement test.

The researcher had used true- experimental design method for her study. The ESL students of ICSE board of grade 7th was chosen as the population and the ESL students of grade 7th of Vidya valley School, Pune were the samples.

The researcher took a pre- test for the control group and the marks were recorded. Then lessons were done by cooperative learning method and post-test was taken to record the observations. Data collection was completed by the researcher and at the end data analysis was done. Later on, the research hypothesis and null hypothesis was studied and accepted or rejected according to the analysis.

Research Discussion

Mathematics for ESL (English as a Second Language) students aims to address the following key aspects: Researcher seeks to examine the impact of cooperative learning strategies on the academic achievement of ESL students in Mathematics. Teacher wants to analyse whether cooperative learning activities enhance ESL students' understanding of mathematical concepts, problem-solving skills, and overall performance in Mathematics assessments.

Secondly researcher aims to explore the influence of cooperative learning on language development among ESL students within the context of Mathematics. She planned to check how cooperative learning tasks facilitate language acquisition, communication skills, and mathematical discourse among ESL learners.

Thirdly, teacher aims to assess the socio-emotional outcomes of cooperative learning experiences for ESL students in Mathematics. This involves examining how cooperative learning activities contribute to ESL students' sense of belonging, self-efficacy in Mathematics, and intercultural competence within diverse classroom settings.

The statement of the problem intends to provide insights into the effectiveness of cooperative learning as an instructional approach for supporting the academic, linguistic, and socio-emotional needs of ESL students in Mathematics education.

Results

1. The cooperative learning was very efficient and successful as children were very happy and confident by their friend's teaching and discussions which gave them better marks in post-test.
2. The teacher acting as the facilitator helped the students to become bold and confident in the learning process. They are confident in asking questions and engaged in discussions freely which boost their communication skills.
3. Generally, it was observed a nonbelonging to the class by the ESL children. But cooperative learning reduced this feeling and the were happy in the group. It gave a boost in their Mathematical ability too, They could mix well in the group and felt that they are accepted by their friends
4. It is observed that children become aware of their friend's situation and are ready to help them. It is actually improving the inclusivity programme in the school. Children became aware of the different culture as well as their own culture and are more responsive in the classrooms.

Recommendations

- 1. Longitudinal Study:** Conduct a longitudinal study to assess the sustained effectiveness of cooperative learning in mathematics for ESL students over an extended period. This would provide insights into the long-term impact and potential benefits of this teaching approach.
- 2. Comparative Analysis:** Compare the effectiveness of cooperative learning with other instructional methods in mathematics education for ESL students. This could involve exploring variations in student outcomes, engagement levels, and language acquisition.
- 3. Teacher Training:** Investigate the influence of teacher training programs on the successful implementation of cooperative learning strategies in mathematics classrooms with ESL students. Assessing the specific training needs and best practices for educators would enhance instructional quality.
- 4. Cultural Considerations:** Explore how cultural backgrounds and language diversity impact the effectiveness of cooperative learning in mathematics for ESL students. Understanding cultural nuances and linguistic differences can inform the adaptation of cooperative learning methods to diverse classroom settings.
- 5. Technology Integration:** Examine the integration of technology tools and digital resources to support cooperative learning activities in mathematics for ESL students. Investigate how digital platforms can facilitate collaboration, provide language support, and enhance learning outcomes in diverse linguistic contexts.

Conclusions

The researcher searched for different types of learning and decided to do cooperative learning. The word problems were identified by the researcher and was selected according to the needs of the students. The groups that were chosen were very effective for the students. There were many problem areas were identified which needs further studies. Students analysed, interpreted and predicted information, by this way they constructed knowledge actively while the programme was implemented. There was difference observed in the scores of pre-tests and post-test of the students. The programme taken for developing the skill of word problems was successful. Due to the programme taken there was rise in the scores of post-tests of students.

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