



Effect of Peer tutoring on Achievement in Mathematics among secondary school students

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Abstract

The purpose of the study was to explore how far peer tutoring could be proved effective in mathematics achievement. A total of 200 9th class students from two secondary schools in Hoshiarpur, Punjab, India had been selected for the study, out of which 100 students were placed in control group and 100 students in experimental group. The experimental group were taught mathematics using peer tutoring strategy, while the control group taught through traditional lecture method. Both groups were matched based on pre-test achievement in mathematics. The Mathematics Achievement test developed by investigator for IX graders was employed as a data collection tool. The findings of the study revealed that the students who were taught employing peer tutoring strategy scored significantly higher in Mathematics than those who were taught using a traditional method.

Keywords: Peer Tutoring, Experimental group, Control group, Mathematics Achievement.

Introduction

Peer tutoring is an age long practice which has gained prominence in recent years and has its mention in National Education Policy, 2020. Peer tutoring is defined as a teaching strategy in which fellow students act as teachers. In this methodology, the high achieving students (termed as tutors) are paired with low achieving students (referred as tutee) in their academic pursuits of learning and understanding the content and getting mastery in the subject of study. It is as a cooperative learning based on a pairing of students with shared learning objectives (Topping, 2018). Peer tutoring is a type of active teaching that promotes inclusiveness while allowing students to learn from one another (Cockeril, Craig & Thurston, 2018). It not only improves academic achievement of students but also improves social relationship among them. It serves as one of the prime objectives of formal teaching and learning of 'No Child Left Behind'. According to Rohrbeck, Ginsburg-Block, Fantuzzo, and Miller (2003), peer tutoring is "systematic, peer-mediated teaching strategies". It is a small group intervention and allows students to get personal assistance which in turns results into increased engagement and achievement at the academic level. Peer tutoring is a method of learning in which students assist one another and educate one another. It is a method of facilitating and empowering students to learn via teamwork, critical and creative thinking, and a facilitator who monitors, intervenes, and assesses group and individual performance (Goodlad and Hirst, 1989).

Teachers design and oversee classrooms in conventional classrooms. It is up to the teacher to select what to teach, when to teach it, and how to teach it. This teacher-centered strategy instills dread in pupils, particularly those who struggle to keep up with the teacher's instructional pace. They are afraid of being judged by the instructor which escalates into panic, resulting in tension, worry, inferiority complex, and a variety of mental health concerns. Peer tutoring, on the other hand, places students/peers in the role of teachers, making instruction more enjoyable and exciting while removing any concerns and anxieties. Students are allowed to ask any question and to seek clarification from one another without fear of being judged.

Several forms of peer tutoring are prevalent like (i) Unidirectional peer tutoring in which the trained/more knowledgeable peer tutor teaches the entire time and the less more knowledgeable student remains in the pair which can be used when there are intellectually sub-

average, autistic or children with certain psychological, intellectual or physical disabilities; (ii) Reciprocal peer tutoring where students with normal/ average intellectual abilities are paired with their own strengths and weaknesses and hence support and teach other using their respective strengths and remove weaknesses of each other; (iii) Class-wide peer tutoring in which the whole class is divided into paired for group peer tutoring and each student engages in reciprocal peer tutoring by giving their partner cues, error correction, and assistance; (iv) Cross-age peer tutoring where the student of higher class/age tutors the younger child.

Topping (2019) had opined that peer tutoring can function effective only in collaborative set up between the teacher, tutor and the tutee, to achieve the common goal. In peer tutoring, learning is done in a non-threatening atmosphere. The students don't feel fear for teacher as the role of teacher is carried out by peer and the teacher assumes the role of a facilitator and guide which in turn make learning joyful for both tutor and tutee and leads to self-learning.

The academic benefits of peer tutoring in all the subjects of curriculum have been widely documented across all levels of education. However its benefit had been widely recognized in the subject of mathematics education (Alegre-Ansuategui et al., 2018).

Therefore the present paper is addressed to exploring the effect of peer tutoring on achievement in mathematics among secondary school students. Mathematics is one of the most respected and dreaded subject by students. Since strong mathematics accomplishment is regarded as a guarantee for future professional success and economic wealth, the importance of mathematics demands for high mathematics achievement at all levels of study. As Douglas and Kristin (2000) argued, teaching strategies and methods should be carefully chosen as teachers sought to improve students' achievement through improvements in their teaching practices. This can only be accomplished by adopting teaching strategies in accordance with the needs of mathematics and level of students.

Emergence of the Problem

With the passage of time, the study of mathematics has become much more popular, and in the current period of science and technology, it has achieved its pinnacle. Human logic and reasoning, as well as efforts to understand the cosmos and ourselves, all depend on mathematics. The study of mathematics fosters logical reasoning and mental rigour while also helping to create mental discipline. Mathematical comprehension is also necessary for learning other academic disciplines like physics, social studies, and even music and art. High academic proficiency in math is regarded as a ticket to a prosperous future.

However, it is not an easy task to teach mathematics successfully and effectively to students with varying levels of intelligence and interest. It also calls for the teacher to give each student individualised attention and support, which is practically impossible for teachers of large classes where the ideal teacher-to-student ratio is only a distant dream. The peer tutoring approach to teaching mathematics appears to be the answer to every issue, including the need for individualised instruction, big class sizes, and the need for students to learn how to get along with one another (one of the major objectives of education as quoted by UNESCO).

However, there was found dearth of studies on effect of peer tutoring on mathematics achievement, mathematics self-concept and mathematics anxiety in Indian context. The significant positive role of peer tutoring on student's understanding of mathematics concepts, principles and skills along with the apparent cultural and system difference between India and the western world has motivated investigator to explore the present problem.

Objective:

- To study whether the groups taught through peer tutoring and traditional instructions differ in mean gain scores on mathematics achievement.

Hypothesis:

- There will be no significant difference in mean gain scores on mathematics achievement between groups taught through peer tutoring strategy and traditional teaching.

Design of the study:

To study the effectiveness of peer tutoring strategy on Mathematics Achievement, two non-randomized groups pre-test post-test design was used. In phase-I, two intact sections of a schools were selected, one group was taken as experimental group and the other as the control group. Both the groups were given pre-test in mathematics achievement; both the groups were matched on the basis of mean and SD in mathematics achievement test (pre-test). In phase-II, experimental group was exposed to treatment by teaching through peer tutoring strategy for a period of 40 days where as control group was exposed to treatment by teaching through lecture method. In phase-III, the

experimental and control group were compared on the basis of mathematics achievement test (post-test). The analysis was carried out on the gain scores in mathematics achievement (Gain Score = Post-test Score – Pre-test Score).

Sample of the study:

For the present study, sample of 200 (100 experimental and 100 control group) students of 9th class of two Secondary Schools were selected through the randomization technique from Hoshiarpur district of Punjab, India.

Tool used:

1. Two Criterion reference-based Achievement Tests in Mathematics were developed by the investigator to measure the achievement of 9th class students in Mathematics as pre-test and post-test.
2. Peer tutoring Modules of mathematics for experiment.

Result and discussion:

For testing hypothesis, mean, standard deviation and t-ratio was worked out on Mathematics Achievement (Gain Score = Post-test Score – Pre-test Score) of control and

Table 1 Significance of difference in Mean Gain Scores in Mathematics Achievement of the students taught through Peer Tutoring Strategy and Traditional Teaching Method (N=200)

Groups	N	Mean	S.D.	SE _M	t-ratio
Experimental Group	100	9.86	5.49	0.55	11.09**
Control Group	100	2.82	3.20	0.32	

** Significant at .01level

Table 4.5 reveals that mean gain scores of mathematics achievement of the groups taught through peer tutoring strategy and traditional teaching method are 9.86 and 2.82 respectively and standard deviations for the same are 5.49 and 3.20 respectively. The t-ratio is 11.09 (p=.000) which is significant at 0.01 level. It indicates that there exists a significant difference in mathematics achievement between the groups taught through peer tutoring strategy and traditional teaching method.

Therefore, Hypothesis stating ‘There will be no significant difference in mean gain scores on mathematics achievement between groups taught through peer tutoring strategy and traditional teaching’ stands rejected.

Further as the mean gain scores of the group taught through peer tutoring strategy was found to be significantly higher than that of the group taught through traditional teaching method, it may also be concluded that the mathematics achievement of the group taught through peer tutoring strategy is higher than that the group taught through traditional teaching method.

The finding is supported by the research findings of Petruț and Visu-Petra (2019) and Thurston et al. (2020).

In comparison to teacher-led instruction, peer tutoring is less stressful since students collaborate and learn from one another. Students find it simple to ask their friends and classmates for help, which is the same reason. Additionally, it is a self-paced learning approach that is appropriate for both high achievers and poor achievers. After carefully examining each participant's unique situation in the current experimental investigation, the researcher has concluded that pairing poor achievers in mathematics with high achievers increases the effectiveness of the peer tutoring technique.

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