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Effectiveness of Team Teaching on Achievement in Algebra at Secondary Level

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ABSTRACT

Team teaching involves a group of instructors working purposefully, regularly, and cooperatively to help a group of students of any age learn. It encompasses all arrangements that include two or more faculty members collaborating in the planning and delivery of a course. Over the years, researchers have expressed concerns about the dynamics between co-teaching partners, with outcomes ranging from highly successful to challenging experiences. Taking into account these contextual elements, there is a need for a descriptive qualitative study that uses teacher testimonies as the primary means of investigating co-teaching in mathematics. This study aimed to examine the effectiveness of team teaching strategies on students' achievement in Algebra at the secondary school level. Specifically, it investigated the significance of the difference between pre-test and post-test mean scores in Algebra for students in the experimental group. It also analyzed post-test performance with respect to variables such as gender, study habits, and parents' educational qualifications and occupations. The study followed a Pre-test: Treatment: Post-test design. Team teaching strategies were implemented with the experimental group, and the results indicated a significant improvement in student achievement in Algebra. However, no significant difference was found in post-test mean scores when analyzed based on gender, study habits, and parental background. The present study highlights the challenges in learning Algebra and demonstrates that well-structured team teaching strategies can greatly enhance student understanding and achievement at the secondary level.

Keywords: team teaching, algebra, mathematics achievement, secondary education

Introduction

Team teaching involves a group of instructors working collaboratively, consistently, and intentionally to support student learning across various age groups. In a team-teaching model, educators jointly establish course goals, design the syllabus, develop lesson plans, deliver instruction, and evaluate learning outcomes. This collaborative approach encourages the sharing of insights, constructive debates among instructors, and even student engagement in evaluating differing teaching perspectives. Drawing on a review of existing literature, this report provides an overview of team teaching, outlines its benefits, highlights common challenges, suggests best practices, and offers recommendations for effectively supporting and implementing team teaching.

Definition of Team Teaching

Davis (1995) characterizes team teaching as "any configurations involving two or more instructors collaborating in the planning and execution of a course." The phrase denotes a collective of educators collaborating as a team to provide instruction. The team often comprises two to five teachers assigned to the same cohort of students. Team teaching can manifest in several ways, such as co-instructing the same group concurrently, segmenting instruction according to certain areas of competence, or instructing subgroups within a larger class.

Types of Team Teaching

Teaching Team teaching encompasses several distinct methodologies. One prevalent method is interactive team teaching, when two faculty members concurrently present to the class. Faculty members rotate in teaching the lesson through a rotational format. This rotational format has several variations based on the subject content and the number of teachers involved. In participant-observer team teaching, all faculty members attend every class, however only one instructor is actively instructing at any given moment. Participating observers among the other teachers may assume roles such as model learner, observer, panel member, or resource (Klein, 1990). The faculty responsible for team coordination organizes and integrates a curriculum to optimize learning and connections through paired or linked courses, an integrated cluster of independent courses, or freshmen interest groups (McDaniel and Colarulli, 1997). This curriculum-level approach to multidisciplinary education, while not strictly team teaching, can facilitate the attainment of certain anticipated benefits associated with team teaching.

Need of the study

The purpose of this study was to examine how teachers understand their experiences in co-taught classrooms as they work to meet the needs of all students. This included. examining their perspectives about the co-teaching model and

Significance of the study

According to the literature on co-teaching, there is some evidence that suggests co-teaching produces promising academic outcomes for students with disabilities (Walther-Thomas, 1997). However, according to Harbort , Gunter, Hull. Brown , Venn , P.Wiley and E. Wiley (2007), "much more information is needed to better understand the exact nature of the roles and behaviors of both the regular education teacher and the special education teacher in these classrooms". In a similar Vein, Bauwens and Hourcade (1991) suggested that when implementing the co-teaching model one must take into account philosophical, theoretical, and procedural considerations. The results of this study highlight and clarify these three concepts. One of the major themes that resulted from this study was role conflict. Participants suggested that, due to a lack of structural continuity, co-teaching partners would often bicker about pedagogical and classroom management issues. Additionally, participants stated that the ambiguous nature of their roles contributed to the amount of conflict within the classroom. These issues eventually at tact the practice of parity in the classroom. According to Kohler-Evans (2006). "the general and special education teachers should treat each other as equal partners". She understands this idea to be true hecause "both teachers re responsible for all the students in the classroom, therefore both teachers should be fully represented when it comes to all aspects of classroom identification". However, teachers in this study suggested that only the general education teachers were represented in the classroom. Taking into account these contextual clements, there is a need for a descriptive qualitative study that uses teacher testimonies as the primary avenue for investigating co teaching

Objective of the Study

The objectives of the study are as follows:

1. To find out the significance of difference between the pre-test and post-test mean scores of the achievement in Mathematics of the experimental group.
2. To find out the significance of difference between the post-test mean scores of the achievement in Mathematics of the experimental group with respect to gender.
3. To find out the significance of difference between the post-test mean scores of the achievement in Mathematics of the experimental group with respect to study habit.
4. To find out the significance of difference between the post-test mean scores of the achievement in Mathematics of the experimental group with respect to parents' educational qualification.
5. To find out the significance of difference between the post-test mean scores of the achievement in Mathematics of the experimental group with respect to parents' occupation.

Hypotheses of the Study

The following hypotheses are framed for this study:

- There is no significant difference between the pre-test and post-test mean scores of achievement in Mathematics (Algebraic Expressions) of the experimental group.
- There is no significant difference between the post-test mean scores of achievement in Mathematics (Algebraic Expressions) of the experimental group with respect to gender.
- There is no significant difference between the post-test mean scores of achievement in Mathematics (Algebraic Expressions) of the experimental group with respect to study habit.
- There is no significant difference between the post-test mean scores of achievement in Mathematics (Algebraic Expressions) of the experimental group with respect to parents’ educational qualification.
- There is no significant difference between the post-test mean scores of achievement in Mathematics (Algebraic Expressions) of the experimental group with respect to parents’ occupation.

Methodology

In the present study, an experimental research method was adopted for its suitability and accuracy in evaluating the effectiveness of instructional strategies. A single group of students, referred to as the experimental group, was selected for this study. Team-teaching strategies and techniques were implemented with this group. The research followed a Pre-test – Treatment – Post-test design, allowing for the assessment of student achievement before and after the intervention.

Sample of the Study

The sample consisted of 8th standard students studying at Government High School, Nayaganaipiriyal Ariyalur district. A total of 50 students formed the experimental group for this study.

Tools Used

The effectiveness of evaluation largely depends on the accuracy of measurement, which in turn relies on the precision of the tool. The researcher developed an achievement test in Mathematics, focusing on Algebra, with guidance from an expert committee. This tool was used to assess students' understanding and mastery of the selected mathematics topic.

Statistical Techniques Used

The researcher used the following statistical techniques for analyzing the data,

1. Mean and Standard Deviation

2. 't'-test and F-test

Testing the Hypothesis

Hypothesis No - 1

There is no significant difference between the pre-test and post-test mean scores of the achievement in Mathematics –

Algebra of the experimental group.

This hypothesis was tested using the 't'-test.

Table 1

Test	N	Mean	S.D	SED	t-value	Level of Significance
Pre-test	50	32.8547	9.5832	1.7340	34.9603	0.01
Post-test	50	93.4752	7.6483			

The above table shows that the computed value of 't' (34.9603) is greater than the critical value of 2.64 at the 0.01 level of significance. Hence, it is significant. Consequently, the null hypothesis is rejected, and it can be concluded that there is a significant difference between the pre-test and post-test mean scores of the achievement in Mathematics – Algebra .It is also inferred that the effectiveness of the Team-teaching strategies had a positive impact on the achievement in Mathematics – Algebra.

Hypothesis No - 2

There is no significant difference between the post-test mean scores of the achievement in Mathematics – Algebra of the experimental group with respect to gender.

This hypothesis was tested using the 't'-test.

Table 2

Gender	N	Mean	P.S.D	SED	t-value	Level of Significance
Male	25	93.2547	7.6483	1.5274	0.2887	NS
Female	25	93.6957				

The above table shows that the computed value of 't' (0.2887) is less than the critical value of 2.64 at the 0.01 level of significance. Hence, it is not significant. Consequently, the null hypothesis is not rejected, and it can be said that there is no significant difference between the post-test mean scores of the achievement in Mathematics – Algebra of the experimental group with respect to gender.

Hypothesis No. 3

There is no significant difference between the post-test mean scores of the achievement in Mathematics - Algebra of the experimental group with respect to study habit.

This hypothesis was tested using the 't' test.

Table 3

Study Habit	**N**	**Mean**	**P.S.D**	**$S.E_D$**	**t-value**	**| Level of Significance**
| Self-study	24	93.3752	7.6483	1.7415	0.0574	NS
Group study	26	93.5752				

The above table shows that the computed value of t (0.0574) is less than the critical value of 2.64 at the 0.01 level of significance. Hence, it is not significant. Consequently, the null hypothesis is not rejected, and it can be said that there is no significant difference between the post-test mean scores of the achievement in Mathematics - Algebra of the experimental group with respect to study habit.

Hypothesis No. 4

There is no significant difference between the post-test mean scores of the achievement in Mathematics - Algebra of the experimental group with respect to parents' educational qualification.

This hypothesis was tested using the 'F' test.

Table 4: ANOVA Table

Source of Variance	**Sum of Squares**	**Df**	**Mean Square**	**F-value**	**Level of Significance**
Between sample	58.3562	4	14.5891	0.8852	NS
Within sample	576.8361	35	16.4810		
Total	635.1923	39			

The above table shows that the computed value of F (0.8852) is less than the critical value of 3.91 at the 0.01 level. Hence, it is not significant. Consequently, the null hypothesis is not rejected, and it can be said that there is no significant difference between the post-test mean scores of the achievement in Mathematics - Algebra of the experimental group with respect to parents' educational qualification.

Hypothesis No. 5

There is no significant difference between the post-test mean scores of the achievement in Mathematics - Algebra of the experimental group with respect to parents' occupation.

This hypothesis was tested using the 'F' test.

Table 5: ANOVA Table

Source of Variance	**Sum of Squares**	**df**	**Mean Square**	**F-value**	**Level of Significance**
Between sample	76.5438	3	25.5146	0.5966	NS
Within sample	1539.4968	36	42.7638		
Total	1616.0406	39			

The above table shows that the computed value of F (0.5966) is less than the critical value of 3.91 at the 0.01 level. Hence, it is not significant. Consequently, the null hypothesis is not rejected, and it can be said that there is no significant difference between the post-test mean scores of the achievement in Mathematics - Algebra of the experimental group with respect to parents' occupation.

Findings

The following are the findings of the present study:

1. The effectiveness of Team-teaching strategies technique on achievement in Mathematics topic Algebraic Expressions was very high.

2. There is no significant difference between the post-test mean scores of the achievement in Mathematics topic Algebraic Expressions of the experimental group with respect to gender.

3. There is no significant difference between the post-test mean scores of the achievement in Mathematics topic Algebraic Expressions of the experimental group with respect to study habit.

4. There is no significant difference between the post-test mean scores of the achievement in Mathematics topic Algebraic Expressions of the experimental group with respect to parents' educational qualification.

5. There is no significant difference between the post-test mean scores of the achievement in Mathematics topic Algebraic Expressions of the experimental group with respect to parents' occupation.

Conclusion

In summary, successful team teaching requires the active institutional and faculty commitment of time, resources, and careful planning. By doing so, team teaching can enhance the teaching and learning experiences of both students and faculty, fulfilling the purposes of university education by helping participants integrate diverse disciplines and perspectives. The present study has investigated the challenging areas in mathematics and the construction of team-teaching strategies and techniques at the secondary level. It found that the effectiveness and utilization of these strategies were very high in terms of student achievement in mathematics. Therefore, team-teaching strategies have a significant positive impact on achievement in mathematics.

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