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Evaluating the Effectiveness of the TIGER Model in Enhancing Interest in Mathematics Among Class 9 Students

Ayushkumar Gandhi
Senior Research Fellow, IITE Gandhinagar

Abstract

Mathematics interest among secondary school students is often observed to be low, leading to disengagement and poor academic outcomes. To address this concern, the present study investigates the effectiveness of the TIGER model—comprising Teacher as Facilitator, Individual Work, Group Work, Evaluation, and Remedial Work—in enhancing the mathematical interest of Grade IX students. The main objective of the study was to examine whether the TIGER model brings about significant improvement in interest levels when compared to traditional teaching methods. A quasi-experimental, non-equivalent pretest-posttest control group design was employed. The sample consisted of 66 students (33 in the control group and 33 in the experimental group) from an school, aged 14–15 years. A researcher-made Mathematical Interest Inventory, validated for content and face validity, was used for data collection. The experimental group was taught using TIGER-based lesson plans, while the control group received conventional instruction. Findings indicated no significant difference in pre-test interest levels between the groups, suggesting initial comparability. However, a significant difference was found in the post-test and mean gain scores, favoring the experimental group. Moreover, a significant improvement in the experimental group's pre- and post-interest scores confirmed the effectiveness of the TIGER model, while the control group showed no such change.

These results support the integration of innovative models like TIGER in mathematics classrooms to enhance student interest and engagement. The study suggests that structured, student-centered pedagogy can significantly improve learning attitudes even in non-randomized classroom settings.

Keywords: TIGER model, Mathematical interest, Secondary education, Student engagement, Teaching strategy

Introduction

Most people consider mathematics as an essential educational subject which builds both analytical aptitude and problem-solving capabilities. Numerous high-school students show minimal interest in mathematics which in turn creates detrimental effects on their schoolwork performance along with student engagement levels. Evidence demonstrates that students' mathematical interest stems directly from their motivation levels and self-assurance along with their educational instruction methods (Middleton & Spanias, 1999). Research done by Singh, et. al. (2002) demonstrated that students who view mathematics as theoretical with no tangible connections to practical uses will lose interest in this subject. Student-led educational methods need active support according to the National Council of Teachers of Mathematics (NCTM, 2000) because they enhance both mathematical comprehension and learner retention.

The NEP 2020 through its sections emphasizes the requirement of innovative pedagogies and engaging approaches in mathematics teaching. The policy endorses conceptual learning through experiential programs and competency evaluations to generate an enjoyable student experience of mathematics (MoE, 2020). Normal school practices continue to opt for rote learning although research-based recommendations aim to prevent declining student interest in mathematics.

Overview of the TIGER Model

To address these challenges, innovative teaching methodologies such as the TIGER Model have been introduced. The TIGER Model, an acronym for *Teacher as Facilitator, Individual Work, Group Work, Evaluation, and Remedial Work,* is designed to foster active participation and student engagement in mathematics. Each component of the model plays a crucial role in enhancing students' mathematical experiences:

1. **Teacher as Facilitator** – The educator shifts from a lecturer to a guide, promoting student-led exploration.
2. **Individual Work** – Encourages independent problem-solving and conceptual clarity.
3. **Group Work** – Facilitates peer collaboration, discussion, and knowledge construction.
4. **Evaluation** – Involves continuous assessment through formative and summative methods.
5. **Remedial Work** – Provides targeted interventions to support struggling learners.

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By integrating these elements, the TIGER Model aligns with contemporary constructivist theories, emphasizing active engagement, contextual learning, and deeper cognitive processing.

Rationale of the Study

Because student mathematics interest continues to decline it becomes necessary to develop pedagogical frameworks which improve student engagement. Several studies have analyzed how different instructional methods affect mathematics achievement results but researchers know less about how the structured TIGER Model affects student interest toward mathematics topics. The research investigates whether the TIGER Model functions as a successful method to restore secondary school students' mathematical interest.

This investigation uses NEP 2020 and NCTM guidelines to conduct research which will evidence-based support for student-centered math instruction that uses interactive classroom methods. The research results will assist existing debates about educational transformation through evidence-based recommendations for teachers and policy makers and curriculum specialists.

Review of Related Literature

Educational research prioritizes student interest development in mathematics studies since it analyzes instruction techniques which promote involvement and teamwork and hands-on learning. Researchers have extensively investigated three key areas regarding students' mathematical attitudes and teaching approaches alongside conceptual learning methods.

Student Interest and Motivation in Mathematics

Student mathematics interest develops based on teaching approaches and classroom educational settings. The research team of Middleton and Spanias (1999) examined all significant elements which drive student motivation in mathematics. The research showed that students develop stronger intrinsic motivation when they encounter mathematics as meaningful subjects which relate to everyday uses. Research showed that students required teacher support together with autonomy in learning and problem-based activities to develop mathematical interest. Singh, Granville, and Dika (2002) evaluated how student mathematics attitudes relate to their academic results. Positive student views about mathematics led them to tackle demanding mathematical problems while continuing their education of complex topics.

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Wang and Degol (2017) used expectancy-value theory to understand mathematics engagement according to their research. The researchers discovered that students base their interest on beliefs regarding mathematical usefulness alongside satisfaction and competence when facing mathematical problems. The TIGER Model demonstrates compatibility with these results because it supports individualized learning while providing group engagement and supplemental instruction to boost student engagement.

Effectiveness of Student-Centered Teaching Models in Mathematics

Researchers have conducted extensive study about student-led learning replacing the traditional memorization approach. The educational approaches of constructivism received analysis from Boaler (2002) in secondary mathematics classrooms. Through her study Boaler proved that students who encountered inquiry-based group learning activities developed better conceptual knowledge and problem-solving skills than other students. Group work and teacher facilitation which the TIGER Model promotes matches this teaching approach. Hiebert and Grouws (2007) proved that educational methods which combine discussion learning together with assessment for learning practices significantly enhance students' mathematical retention and interest levels.

The research by Capraro, Capraro, and Morgan (2013) studied how cooperative learning methods influence student attitudes in math classes. The students involved in peer collaboration with structured group work showed improved motivation while experiencing reduced anxiety during mathematics learning based on research results. The TIGER Model uses group-based teaching methods which find support from this evidence.

The Role of the TIGER Model in Mathematics Education

Numerous teachers have investigated guided inquiry and teacher facilitation practices to transform STEM education (Dole, Bloom, and Kowalske 2016). Active participation in guiding educational tasks by students enhanced both their curiosity and the depth of their conceptual understanding as found in the research. The facilitative role described within the TIGER Model receives support from this analysis because it proves effective at engaging students.

Smith and Star (2007) conducted experimental research to study the influence of differentiated instruction in mathematics educational settings. The remedial support targeting students led to an increase in their confidence combined with enhanced interest in mathematics according to the study results. The research confirms the importance of remedial assistance in the mathematics teaching and learning.

Objective of Study

1) To assess the effectiveness of the TIGER Model in fostering students' interest in mathematics compared to traditional teaching method.

Hypothesis of Study

H_{01}: There is no significant difference between the pre-interest scores of the Experimental and Control groups.

H_{02}: There is no significant difference between the post-interest scores of the Experimental and Control groups.

H_{03}: There is no significant difference in the mean gain in interest scores between the Experimental and Control groups.

H_{04}: There is no significant difference between the pre-interest and post-interest scores of the Experimental group.

H_{05}: There is no significant difference between the pre-interest and post-interest scores of the Control group.

Methodology

The present study adopted an experimental method with a non-equivalent pretest-posttest group design. In this study, interest in mathematics was the dependent variable, while the TIGER Model served as the independent variable.

Sample

The study sample included 66 students, divided equally into two groups—33 in the experimental group and 33 in the control group. All participants were from an urban setting and fell within the 14–15 years age range. The school was selected using a convenience sampling method.

Tools Used

1. Lesson Plans Based on the TIGER Model – The researcher developed and validated lesson plans for implementing the TIGER Model with the help of subject experts and senior teachers.

2. Self-Developed Mathematical Interest Inventory – The researcher constructed an Interest Inventory consisting of 4 components, each with 5 items. The inventory was validated for content and face validity through expert review. Total 20 items and 12 positive and 8 negative items in tool.

Mathematics Interest Inventory

Component 1: Intrinsic Motivation Towards Mathematics

(Based on Self-Determination Theory, Deci & Ryan, 1985 – Intrinsic motivation is key to engagement in learning.)

Component 2: Perceived Utility and Real-Life Relevance

(Based on Expectancy-Value Theory, Eccles & Wigfield, 2002 – Interest increases when a subject is seen as useful.)

Component 3: Curiosity and Willingness to Explore Mathematics

(Based on the Theory of Interest Development, Hidi & Renninger, 2006 – Curiosity and deep engagement enhance interest.)

Component 4: Emotional Response and Self-Perception in Mathematics

(Based on Control-Value Theory, Pekrun, 2006 – Emotions play a crucial role in shaping interest in a subject.)

Data Analysis

H_{01}: There is no significant difference between the pre-interest scores of the Experimental and Control groups.

Table 1:

Difference in Pre-interest Scores between Control and Experimental Group

Group	Size	Mean	t-value	p-value
Control	33	57.31	0.22	0.826
Experimental	33	58.27		

Since the *p*-value (0.826) is greater than the significance level of 0.05, the null hypothesis is accepted at the 0.05 level of significance. This indicates that there is **no statistically significant difference** between the pre-interest scores of the control and experimental groups. Therefore, both

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groups were comparable in terms of their interest in mathematics before the implementation of the TIGER model.

H_{02}: There is no significant difference between the post-interest scores of the Experimental and Control groups.

Table 2:

Difference in Post-interest Scores between Control and Experimental Group

Group	Size	Mean	t-value	p-value
Control	33	58.45	18.27	0.000*
Experimental	33	72.76		

The computed t-value of 18.27 with a p-value of 0.000 ($p < 0.05$) signifies a statistically meaningful variation between the two groups. Therefore, the null hypothesis (H_{02}), which assumed no significant difference in post-interest scores between the experimental and comparison groups, is rejected. This outcome indicates that the TIGER approach to teaching effectively increased students' interest in learning mathematics within the experimental group.

H_{03}: There is no significant difference in the mean gain in interest scores between the Experimental and Control groups.

Table 3:

Difference in Mean gain in interest Scores between Control and Experimental Group

Group	Size	Mean	t-value	p-value
Control	33	1.14	18.00	0.000*
Experimental	33	14.49		

The control group recorded a mean gain in interest score of 1.14 with a standard deviation of 4.26, whereas the experimental group achieved a notably higher mean gain of 14.49. The computed t-value was 18.00, accompanied by a p-value of 0.000 ($p < 0.05$), confirming a statistically significant difference in gain scores between the two groups. As a result, the null hypothesis (H_{03}) is rejected, indicating that the TIGER Model significantly improved students' interest in mathematics when compared to conventional instructional methods.

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H_{04}: There is no significant difference between the pre-interest and post-interest scores of the Experimental group.

Table 4:

Difference in pre and post-interest Scores in Experimental Group

Group	Size	Mean (Pre)	Mean (Post)	t-value	p-value
Experimental	33	58.27	72.76	19.54	0.000

The mean pre-interest score of the experimental group was 58.27, while the mean post-interest score was 72.76, resulting in a mean difference of 14.49. The t-value calculated was 19.54 with a p-value of 0.000, which is less than 0.05. This indicates a statistically significant improvement in the interest scores of the experimental group after the implementation of the TIGER Model. Hence, the null hypothesis (H_{04}) is rejected, and it can be concluded that the TIGER Model was effective in increasing students' interest in mathematics.

H_{05}: There is no significant difference between the pre-interest and post-interest scores of the Control group.

Table 5:

Difference in pre and post-interest Scores in Control Group

Group	Size	Mean (Pre)	Mean (Post)	t-value	p-value
Control	33	57.31	58.45	1.54	0.130

The mean pre-interest score of the control group was 57.31, and the mean post-interest score was 58.45, leading to a mean difference of only 1.14. The calculated t-value was 1.54, and the p-value was 0.130, which is greater than 0.05. This means that the improvement in interest scores for the control group is not statistically significant. Hence, the null hypothesis (H_{05}) is accepted, and it can be concluded that there was no significant change in the mathematical interest of students in the control group who were not exposed to the TIGER Model.

Findings

The analysis of the pre-interest scores showed no significant difference between the control and experimental groups, indicating that the two groups were relatively similar in their initial interest levels in mathematics, despite being non-equivalent. This establishes a fair baseline for comparison. After the intervention, the post-interest scores revealed a statistically significant difference in Favor of the experimental group, suggesting that the TIGER model was more effective than traditional methods in enhancing students' mathematical interest. The mean gain in interest scores was also significantly higher for the experimental group, further highlighting the impact of the TIGER model.

Moreover, the experimental group showed a significant improvement in their interest scores from pre- to post-test, while the control group did not show any meaningful change. This demonstrates that the TIGER model's structured, interactive, and student-centered approach successfully nurtured students' interest in mathematics. The results confirm that even with non-randomized groups, the TIGER model has the potential to foster greater engagement and curiosity in mathematics compared to conventional teaching methods.

Conclusion

The study concludes that the TIGER model effectively enhances students' interest in mathematics. By incorporating steps like facilitation, individual and group work, evaluation, and remedial teaching, the model creates a more engaging and learner-centered environment. It shifts the focus from rote learning to active participation and reflection, making mathematics more meaningful for students. The model aligns with NEP 2020's emphasis on experiential learning and inclusive education. Results indicate that students taught through the TIGER model show greater improvement in interest compared to those taught by traditional methods. This model, therefore, holds promise for transforming mathematics classrooms.

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