



Facilitation And Empowerment In The Mathematics Classroom: The Conceptual Underpinning Of The Tiger Model

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Abstract

The TIGER (Teacher as Facilitator, Individual Work, Group Work, Evaluation, Remedial Work) model represents a progressive approach to mathematics education, emphasizing active learning and student empowerment. This conceptual research paper explores the theoretical underpinnings of the TIGER model, which aims to transform traditional mathematics instruction into an engaging, student-centered process. The paper highlights the importance of active learning in fostering students' logical reasoning, creativity, and self-confidence in mathematics. By integrating individual and group work, the TIGER model supports collaborative problem-solving and personalized learning experiences. The evaluation and remedial components ensure that all students achieve mastery, addressing individual learning needs through continuous assessment and targeted support. Drawing on constructivist theories and educational research, the paper discusses the shift from conventional teacher-centered approaches to a more dynamic, process-oriented pedagogy that encourages deep understanding and retention of mathematical concepts. The study also provides practical recommendations for implementing the TIGER model in diverse educational settings, emphasizing the need for comprehensive teacher training, structured group work, and reflective practices. Through this model, students are encouraged to explore mathematics creatively, leading to a more meaningful and lasting understanding of the subject. The TIGER model not only enhances academic achievement but also cultivates essential life skills such as critical thinking, collaboration, and self-directed learning.

Keywords: Active Learning, TIGER Model, Personalised and Collaborative Learning, Self-directed Learning and Remedial Work

Introduction

Mathematics is one of the disciplines that is applicable to different branches such as science, business, computer sciences, engineering, etc. One can apply mathematics in every area of life. By considering its application in daily life, Mathematics has been introduced in education as study subject from very initial stage i.e., from kindergarten. Students learn basic counting skills, basic addition and subtraction, comparing numbers, etc. in their early years.

According to NCF 2005, "Mathematics being a compulsory subject of study, access to quality mathematics education is every child's right. We want mathematics education that is affordable to every child, and at the same time, enjoyable. With many children exiting the system after Class VIII, mathematics education at the elementary stage should help children prepare for the challenges they face further in life.

Apart from being useful in everyday life, mathematics also fosters logical thinking, abstract reasoning, and creativity. It adds a new depth to thinking. It also improves one's capacity for creating and comprehending arguments as well as for connecting ideas. Most students have little opportunity to experience creativity in mathematics (Silver, 1997). Therefore, a teacher should make sure that every student practices the idea until each student has mastered the topic on their own.

Objectives of Paper

The major objectives of the paper were:

- 1) To Theorize the Underpinnings of the TIGER Model in Mathematics Education.
- 2) To Conceptualize the Role of Active Learning in Mathematics Instruction.
- 3) To Propose Recommendations for the Implementation of the TIGER Model in Diverse Educational Settings.

Review of Related Literature

Review of related literature shows that strategies which differ from conventional ones especially those involving activity-based learning, learning together, two-tier diagnostic, active learning, group tutoring, Jigsaw strategy, constructivist method, mathematical games, collaborative learning, mathematics laboratory have made a positive influence on achievement in mathematics and to a large extent, this has helped in developing a positive attitude and interest in the subject as well.

Olanrewaju (2019) found out that there is a significant difference in the mathematics learning achievement of secondary school students exposed to collaborative learning technique than those in the control group. TIGER Model uses Group work as a component and it is supported by the study in which Hobri et al. (2018) found out that Learning Together model contributed to the development of students' mathematical performance due to proper formation of groups, group members' cooperation to each other's learning. This result is supported by Jitendra et al. (2013). Freeman et al. (2014) found out that active learning increases scores on concept inventories more than on course examinations, and that active learning appears effective across all class sizes. This supports the TIGER Model which promotes active learning through the process. Many reviews support the steps in TIGER Model such as individual or personalized work and Group work.

Festus (2013), Kumar (2014) & Khurana (2018) recommended that students understand mathematical concepts easily and have better retention power when they are involved in various activities in Mathematics. Nfon and Fabian (2018) recommended that mathematics teachers should use mathematical games such as tic-tac-toe, dots and boxes, playing cards, dice games, ludo games to enhance socialization amongst learners, class participation, arouse and sustain interest, and achievement in class. TIGER Model makes use of these activities to impart the basic ideologies of the content. TIGER Model also gives due importance to the home work part which is supported by Cheema et al. (2015) which showed that both maths anxiety and time spent on homework had a significant effect on maths achievement.

Recommendations of Various Commissions regarding Mathematics

NPE (1986) re-emphasizes that mathematics should be visualized as the vehicle to train child to think, reason, analyze and articulate logically. This means that the teaching of mathematics should not be a simple narrative type of activity. As per NCF-2005, the main goal of mathematics should be able to address many problems from everyday life and offer tools to solve them. At the stage of secondary education, a consolidation of basic concepts and skills learnt at primary stage is necessary. Mathematics at the upper primary stage is a major challenge and has to perform the dual role of being close to both the experience and environment of the child and being abstract.

NEP 2020 also recommended Engagement with the content and association of new experiences to previous one is very much needed to make learning meaningful. Approaches in mathematics which promotes higher order thinking instead of rote memorization are to be adopted. NEP, 2020 proposed the adoption of experiential learning for all stages of school education. Experiential learning is the practice of learning through doing. It encourages the students to have firsthand experiences with the materials, rather than learning through someone's else experience in textbook and lectures.

Paradigm shift from conventional method to active learning method

Popular education advocate John Dewey has emphasized child-centered curriculum, where teaching and learning is done focusing on the individual personality and capability of the child. Many studies have shown that this educational approach brings out the best in children.

Table 1

Shift in the role of teacher

Conventional Learning	Active Learning
Teacher centered classroom	Leamer centered classroom
Product centered learning	Process centered learning
Transmitter of knowledge	Organizer of knowledge
Doer for children	Teacher as enabler
Subject specific focus	Holistic learning focus

As the role of the teacher changes, students' roles in the classroom will also eventually alter.

Table 2

Shift in the role of student

Conventional Learning	Active Learning
Passive recipients of knowledge	Active and participatory learner
Focus on answering question	Focus on asking questions
Being spoon-fed	Responsibility for their learning
Competing with one another	Collaborating in their learning
Learners of individual subject	Connecting their learning

Active Learning in Mathematics

Active Learning Methodology consist of three components viz., 'active', 'learning' and 'methodology'. With regard to these terms, many authors and educationalist have given clear definitions for the terms active, learning and methodology. The definitions for the above are as follows:

- **"Active"** refers to action; one is always involved, energetic, and diligent.
- **'Learning'** to gain knowledge or information of; to ascertain by inquiry, study, or investigation; to receive instruction concerning; to acquire understanding of something.
- **'Methodology'** a procedure, technique or way of doing something especially in accordance with a definite plan.

The term 'active learning' has commonly been applied to a diverse range of learning activities, including hands-on work, role-playing, work experience, small-group discussions, cooperative problem-solving, and extended project work. Kyriacou (1992) state that problem solving, small group discussion, practical simulations, use of structured individualized programmes, computer-based activities, mathematical projects have a positive impact in the learning of children.

ALM may be seen as the bridge that aligns the processes of school education to this basic requirement. ALM seeks to build a link between knowledge and empowerment and seeks to equip each student with the ability to think, to apply and to discover. (Active Learning Methodology, Sarva Shiksha Abhiyan, Tamil Nadu). In Active learning, the teacher is both a teacher and a learner at the same time. The teacher "becomes a resource rather than an authority".

TIGER Model —An Active learning model of Mathematics

TIGER Model of teaching is an active learning method formulated especially for mathematics subject. TIGER Model aims to have active participation of students in the teaching learning process. The Acronym TIGER is T- Teacher as a facilitator, I- Individual work, G- Group work, E- Evaluation, R- Remedial.

According to Jangira (1983), “A model of teaching is set of interrelated components arranged in a sequence which provides guideline to realize specific goals.” There are different specifications for model of teaching.

- 1) Specifications of Environment (Interaction)
- 2) Specification of Operation (Mechanism)
- 3) Specification of Criterion of performance
- 4) Specification of learning Outcome

The components of TIGER Model of teaching are:

- **Focus:** The central Aspect of Teaching learning process. TIGER Model focuses on active participation and mastery learning in centre.
- **Syntax:** It describes the phases of Model. Each model has different strategies. TIGER Model also has various steps for planning a teaching learning interaction in classroom.
- **Principles of Reaction:** It explains the procedure in which the teacher deals with the reactions of students. TIGER Model involves the reinforcement element and based on that the planning of remedial teaching.
- **Social System:** It describes the students & teacher roles & relationships the kinds of norms that are encouraged. TIGER Model involves scope of group learning for students. That encourages social interaction in classroom.
- **Support System:** It deals with the use of other teaching aids, human skills & capacities & technical facilities. Various activities, teaching learning aids, self-learning materials, puzzles, etc was used in TIGER Model of teaching.
- **Application:** It deals with the further applicability of the Model for different curriculum & classes. It helps in developing cognitive behaviour and social behaviour of child in teaching learning process.

Steps in TIGER Model

➤ Engage (Motivation, Recall, Survey)

The teacher prepares the learner for the learning process by stimulating students' minds to receive the material, teachers can kindle their attention. Engage part involves Motivation, Recalling and Survey.

- **Motivation:** The teacher uses puzzles, mathematical games, mathematicians' biographies, and real-life situations to grab the pupils' attention.
- **Recall:** The teacher checks the pupils' prior knowledge by asking a few straightforward questions during the recalling phase. Research in classrooms demonstrates that retrieval practice is an extremely robust strategy across age groups and subject domains (McDermott, 2021). Students who use retrieval practice perform better on complex tasks and show improved metacognition (Pooja & Bain, 2019).
- **Survey:** After kindling the students' interest in the material, the teacher asks them to share their views on the chapter from the textbook. This helps the student understand the principles and how they will apply them to solve difficulties.

➤ Understanding

The understanding part of the TIGER Model is where the majority of learning takes place. Here, using the required materials and activities which involves the students and teachers they go through all the definitions, theorems, applications, and formulas related to the idea. Once every topic has been explained, the teacher goes through a few problems. The teacher solves the problem and provides step-by-step explanations.

➤ **Group Work**

Learning is fundamentally a social process. The concept of collaborative learning is closely linked to Vygotsky's "zone of proximal development," which examines what a student can do with assistance from peers or adults.

- a) **Students solving Challenging problem in groups:** Every group attempts to address problems as a whole, with equal involvement from every member.
- b) **Presentation to the class:** The group presents their problems or results to the entire class. Every time, a different group representative should be chosen, and each member should have the opportunity to present the group activity.

➤ **Reinforcement**

In order to improve students' comprehension of a concept that is lagging behind, teachers ought to gather more resources. To reinforce the principles, the teacher uses a variety of teaching aids.

➤ **Evaluation**

To make sure that students understand, the teacher needs to pose brainstorming questions. Instructors should evaluate their own methods of instruction using the evaluation section. Evaluation involves three types of assessment. Assessment of learning, Assessment for Learning & Assessment as learning.

- **Assessment of Learning:** include teachers evaluating student achievements using evidence of their students' learning.
- **Assessment as Learning:** involves utilizing data on student progress to guide instructional strategies and promote learning for students.
- **Assessment for Learning:** includes keeping track of the student's own progress and reflection on what they have learned.

➤ **Remedial Teaching**

Students who require extra assistance in learning the topics should receive special attention and care from the teacher.

➤ **Follow Up**

If assistance is required, the teacher should provide it and give instructions to finish other problems of a similar nature in the exercise that is being discussed.

As a result, the TIGER Model enables students to investigate mathematics, come up with original solutions to challenges, and get a deeper comprehension and lasting knowledge of ideas. They become more driven to study and work harder.

Benefits of TIGER Model

The TIGER Model assists educators in improving their instruction and evaluating the efficacy of their strategies.

Children in this paradigm are also accountable for evaluating their own work as well as that of their peers and group projects.

They are able to pinpoint their areas of weakness and understanding. If they don't understand, they can receive quick remedial instruction.

Recommendations for implementing TIGER Model in classroom

Start with Comprehensive Teacher Training: Educators should be well-versed in the components and philosophy of the TIGER Model. Conduct workshops and training sessions to familiarize teachers with the model's structure, including their role as facilitators, and how to effectively implement each phase.

Create a Collaborative Learning Environment: Foster a classroom atmosphere that encourages group work and peer collaboration. Arrange students into diverse groups, ensuring a mix of abilities to promote cooperative learning.

Incorporate Engaging and Motivational Activities: Begin lessons with engaging activities such as puzzles, mathematical games, or real-life problem scenarios to capture students' interest. This aligns with the "Engage" phase of the TIGER Model, which aims to motivate students and prepare them for deeper learning.

Emphasize the Understanding Phase: Dedicate ample time to the "Understanding" phase, where the teacher provides clear explanations of mathematical concepts, followed by step-by-step problem-solving demonstrations. Use visual aids, real-life examples, and interactive tools to enhance comprehension and retention.

Implement Structured Group Work: Ensure that group activities are well-structured, with clear objectives and guidelines. Encourage students to present their group's findings to the class, which helps reinforce their understanding and builds confidence. Rotate leadership roles within groups to develop communication and leadership skills among all students.

Use Continuous Assessment and Feedback: Regularly assess student understanding through formative assessments like quizzes, class discussions, and group presentations. Use the results to provide immediate feedback and to identify areas where students may need additional support, aligning with the "Evaluation" and "Remedial Teaching" components of the TIGER Model.

Plan for Remedial Teaching: After each lesson, identify students who struggle with certain concepts and provide targeted remedial instruction. This can include one-on-one sessions, additional practice problems, or differentiated instruction strategies to ensure that all students achieve mastery.

Assign Meaningful Homework: Design homework assignments that reinforce the day's lessons and offer opportunities for students to apply what they have learned. Ensure that homework tasks are varied and include both individual and collaborative components, allowing students to explore mathematical concepts in different contexts.

Encourage Reflective Practices: At the end of each lesson, engage students in reflective activities where they can assess their own learning and identify areas for improvement. This could include journaling, peer feedback, or self-assessment checklists, helping students take ownership of their learning process.

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