

## The Role of Games in Improving Learners' Interest in Mathematics

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### Abstract

The present study was conducted to address the academic problems among fifth-grade students at Moallem Farhangshahr Elementary School, located in Amol. The research examined the lack of interest among students when participating in classroom mathematics activities, their tendency to avoid completing homework assignments, and boredom or fatigue during math lessons. The study aimed to guide students toward overcoming these challenges and create interest in learning mathematics. This research had a qualitative type and was designed as action research. Data were collected through observation, interviews (with parents, students, and colleagues), initial assessment, completing the questionnaires, and evaluations, participation in polls via the SHAD application, completing the checklists, students' notes, and database searches. The collected data revealed several causes, including math-related fear, weak educational knowledge, outdated instructional methods, low self-esteem, and a lack of engagement from previous years. In the next phase, appropriate solutions were proposed (e.g. correcting parental behavior, using games in teaching lessons, assigning lower homework, playful and indirect methods for assessing math, creating motivation, and rewarding after positive class participation and practice of textbook exercises throughout the 2023–2024 school year. The results indicated that students who, at the beginning of the school year and the past years, had difficulties in math tasks and frequently made excuses and received evaluations labeled "More effort needed" or "Fair" often achieved "Good" or "Very good" ratings, while the number of those with "More effort needed" or "Fair" rates significantly declined.

The research results indicated that students who learned math content via games experienced more in-depth learning. By using the play-based method, educators can teach a wide range of mathematical content without causing frustration among students, making the learning enjoyable. As a result, students developed a stronger interest

in mathematics and became more enthusiastic and actively involved in the learning process.

**Keywords:** Game, Mathematics, Interest  
**Introduction**

This study was conducted during the 2023–2024 academic year with the objective of increasing students' interest in mathematics by using game-based methods in Class 502 at Moallem Farhangshahr Elementary School. The idea for solving this problem emerged when I noticed that most of my students lacked interest in math. They became tired quickly, and their performance on the initial assessments at the beginning of October was not satisfactory.

Since formal instruction in mathematics begins at the elementary level, it is essential to build a solid foundation that will have a lasting impact. Additionally, children's attitudes toward this subject should be shaped positively so that deep connections can be made between math concepts and their life experiences.

Various factors can influence this outcome, including teaching strategies, types of educational aids, the learning environment, personal and individual factors, family factors, and the learner's attitude toward mathematics.

While games are tools for children's entertainment, they also possess educational and developmental value. Teaching content through playful activities causes deeper and more enduring learning and increases their interest in learning as students acquire knowledge in a relaxed and pressure-free manner. One significant advantage of instructional games is that they are compatible with diverse learning styles (Bloom & Yakom, 1996). Game-based learning focuses on thinking and creativity instead of memorization. Teaching through games is an effective educational strategy for encouraging student engagement and fostering their creativity. During games, children are active, engage in interaction, learn social skills, and share experiences with one another. This accelerates learning by sharing a set of knowledge and experience in a short time. Some educators argue that play should be

separate from the educational process but other scholars like Montessori, Froebel, and Friedrich have emphasized the value of games for education. Play is recognized as one of the most effective active teaching methods. By enhancing motivation, games can improve academic outcomes and lead to deeper learning (Gheitasi et al., 2023). The purpose of this research is to introduce suitable games that enable students to learn and solve mathematics with greater ease and enjoyment. The significance of this study lies in its demonstration of how play can facilitate indirect instruction and playful assessment, thereby reducing the stress and pressure in students. The goal is to make learning enjoyable, minimize stress, and shift students' negative attitudes.

**Main Objective:** To evaluate the effect of games on improving elementary students' interest in mathematics at Moallem Farhangshahr Elementary School in Amol.

### Subsidiary Objectives:

To identify and resolve familial obstacles in learning mathematics, explore and identify innovative approaches in teaching mathematics, detect classroom factors that stimulate student engagement, eliminate fears for learning mathematics, and foster motivation and attitudes in students toward mathematics.

### Methods

This research was conducted as an action research project in a fifth-grade elementary classroom with a total of 34 students. Therefore, through collecting relevant data and information, I needed to better understand the existing conditions and pay closer attention to various factors to identify the core problem(s) and address them using appropriate strategies.

**Table 1: Data Collection Method**

<b>Data Collection Instruments</b>	Observation	Teacher's Observation
	Interview	Interview with the fourth-grade colleague Interviews with students' parents Interviews with students
	Evidence	Diagnostic assessment from fourth to fifth grade, checklist from the first chapter of the math textbook, oral multiplication questioning, handwritten notes from students about their feelings toward math in October, and a pencil-and-paper assessment from chapter one

### Research Instruments

#### 1. Observation

**Table 2: Analysis and Summary of Observation/Evidence 1**

Type of Observation	Quantity or Observation Outcome
During teaching (math class)	51% of the students displayed signs of fatigue or lack of interest.
	25% were doing textbook activities.
	21% were doing in-class exercises.
	8% participated in class.
	5% of students asked questions.
During other subjects	Students did not show signs of fatigue or fear and were happy.

**Analysis:** As indicated through classroom observation, it became clear that students lacked interest in mathematics. They easily lost interest and became tired. They showed little inclination to solve textbook exercises, participate in discussions, or ask questions.

## 2. Interview

**Table 3: Analysis and Summary of Interviews/Evidence 1**

Analysis of Interviews
During interviews with parents, it became apparent that they were not satisfied with their children's mathematical performance, indicating that the students had a weak mathematical foundation. Moreover, the low literacy level of many parents was contributing to a negative perception of math among the children.
The previous year's teacher also confirmed that students lacked interest in math and expressed worry during lessons.
Based on interviews with students: 71% did not like mathematics. 21% had a moderate interest in math. 6% liked math. 2% enjoyed mathematics.

**Analysis:** As reflected in the interviews, most students in this class had little interest in mathematics and did not enjoy it.

## 3. Questionnaire

**Table 4: Analysis and Summary of Questionnaires (No. 1)**

Analysis and Summary of Questionnaires Completed by Students
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<b>Question 1:</b> Teacher's level of explanation – 88% chose the highest level.
<b>Question 2:</b> Level of interest in mathematics – 73% chose the lowest level.
<b>Question 3:</b> Satisfaction with forming group activities – 44% chose the moderate level.
<b>Question 4:</b> Changing teaching methods – 58% chose the highest level.
<b>Question 5:</b> Desire to change evaluation methods – 55% chose the highest level.
<b>Question 6:</b> Using games in math learning – 88% chose the highest level.

**Analysis:** The statistical data displayed in the table above demonstrates that while the majority of students are satisfied with the extent of the teacher's explanations, they show little interest in mathematics. Many of them express a desire for changes in instructional and assessment methods. A considerable number prefer to learn math through games. This supports the initial claim that students are not interested in math and are seeking changes in traditional methods and attractiveness in math. Therefore, our hypothesis regarding students' lack of interest in mathematics was confirmed.

#### 4. Evidence

**Table 5: Data Analysis of Evidence Data (No. 1)**

Analysis and Summary of Evidence
a) Students' handwritten notes
b) Diagnostic initial assessment from Grade 4 to Grade 5
c) Completion of checklist form for Chapter 1 of the math textbook
d) Pencil-and-paper assessment for the end of Chapter 1

**Analysis:** The evidence and the effort in gathering them indicate a clear problem of the lack of interest in math among my students, leading to a low mathematical foundation.

#### Implementation of Final Strategies:

The main aim of this action research project was to use games to improve student interest in mathematics and to make fifth-grade students at Moallem Farhangshahr Elementary School (Class 205) interested in mathematics.

- Family Involvement:** Families were asked to praise students immediately whenever they completed their exercises. They were also encouraged to refrain from conveying stress or negative feelings to their children.
- Changing the Teaching Method:** By playing games, I helped students to

learn the concepts more easily. Lessons were delivered playfully and indirectly by both movement and joy in group and individual participation. This helped students overcome fatigue and disinterest, contributing to their physical and social growth. Unlike before, students no longer complained of exhaustion or hurried out of the classroom but they were eager to continue with targeted instructional games. The teacher became a guide, helping navigate and solve any difficulties.

The use of games appears to have made changes, moving us closer to our goals. After reading Volume II of Instructional Games for Math Class by Reza Ali Norouzi et al., I extracted the following games to implement with my students as follows:

- Game 1:** Find Your Team!
- Game 2:** What's Your Height?
- Game 3:** Graph Game
- Game 4:** Multiply Using Three Dice (understanding the volume)
- Game 5:** Bowling
- Game 6:** Find the Equivalent Fractions
- Game 7:** Tile the Schoolyard
- Game 8:** Calculate the Perimeter of Geometric Shapes
- Game 9:** Roll Dice Up to Ten

## Results

My students did not show any signs of tiredness and disinterest during math lessons no longer. They participated actively in class activities and did math exercises eagerly. The students became self-driven, energetic, and responsible and enjoyed their time in math class.

The pencil-and-paper assessment conducted after the holiday, the checklist for chapter seven, and the evaluation of students' handwritten notes all reveal improvements in their learning and interest in the subject.

Through the measures implemented, particularly using games to enhance math interest among fifth graders, I found a substantial reduction in students' lack of interest in math. They showed excitement about having their homework reviewed daily and engaged enthusiastically in classroom tasks. Their confidence grew, and their eagerness to learn increased. Compared to the start of the academic year, students have developed not only the ability to complete homework assignments more effectively but also the skills necessary to learn mathematical concepts and actively participate in class activities, showing significant progress.

The school administration expressed their satisfaction with the students' progress, and parents were delighted to see behavioral changes, improved learning levels, and interest in math among their children.

Moreover, the students reported feeling relaxed and content with math; they no longer experienced the previous stress and were happier.

## Comparison Between Evidence 1 and Evidence 2 (Observation Checklist Graph)

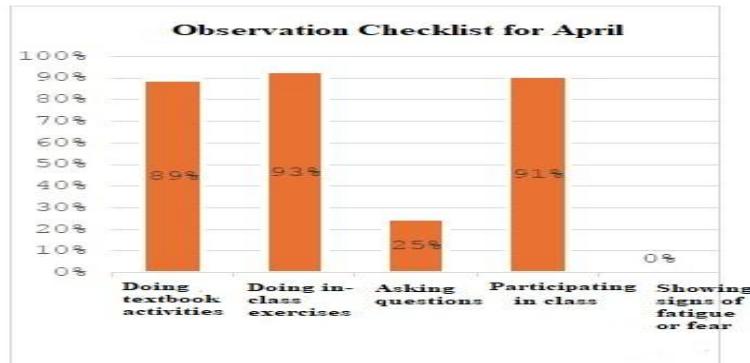
### Evidence 1



**Figure 1:** Observation Checklist for the Third Week of October

It seems that students did not demonstrate much interest or engagement in math classes.

## Evidence 2



**Figure 2:** Observation Checklist for April

Students exhibited an interest and attitude toward math lessons.

According to the Checklists of Evidence 1 and 2, the rate of doing activity increased from 25% to 89%, representing a 64% improvement. Furthermore, doing in-class exercises rose from 21% to 93%, a 72% increase. “Asking questions” increased from 5% to 25%, reflecting a 20% rise. Participation in class increased from 8% to 91%, showing an 85% increase, and showing signs of fatigue or fear dropped from 51% to

0%, indicating a 51% improvement in student engagement and lack of fatigue.

## Comparison of Questionnaires for Evidence 1 and 2

**Evidence 1:** For question two (“How interested are you in math?”), the number 25 from the low rating scale indicates that 25 students are not interested in mathematics.

**Evidence 2:** For question one (“How interested are you in math?”), the number 30

from the high rating scale indicates that 30 students are interested in mathematics.

### **Evidence 1**

**Table 6: Analysis and Summary of Questionnaires**

<b>Analysis and Summary of Student-Completed Questionnaires</b>
Question 1: Teacher's level of explanation — 88% of students chose the high rating scale.
Question 2: Interest in mathematics — 73% chose the low rating scale.
Question 3: Satisfaction with forming classroom groups — 44% chose the moderate rating scale.
Question 4: Changing teaching methods — 58% chose the high rating scale.
Question 5: Changing assessment methods — 55% chose the high rating scale.
Question 6: Using games as a method in learning mathematics — 88% chose the high rating scale.

### **Evidence 2**

**Table 7: Analysis and Summary of Questionnaires**

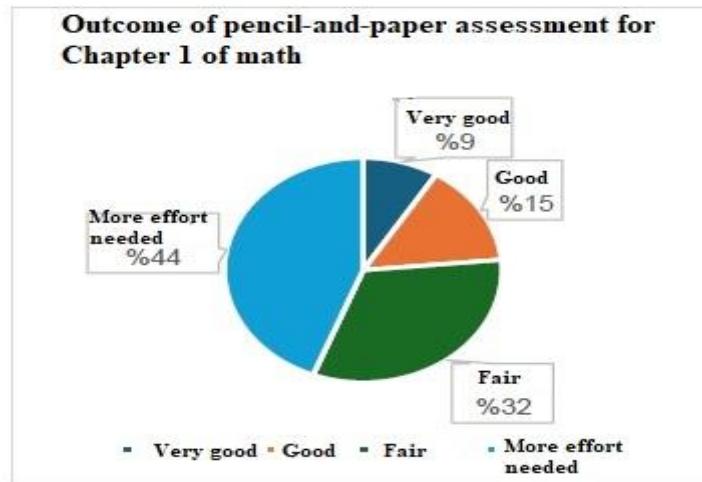
<b>Analysis and Summary of Student-Completed Questionnaires</b>
Question 1: Interest in mathematics— 88% of students chose the high rating scale.
Question 2: Satisfaction with forming classroom groups — 79% chose the high rating scale.
Question 3: Enjoyment from changes in teaching methods — 91% chose the high rating scale.
Question 4: Level of interest in playing games in math learning — 97% chose the high rating scale.
Question 5: Level of learning mathematics — 73% chose the high rating scale.

Question 2 from Evidence 1 corresponds to Question 1 in Evidence 2.

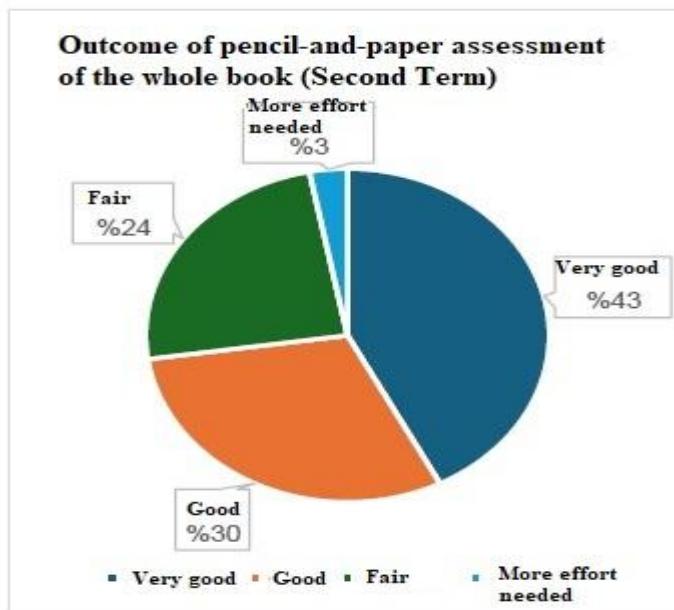
The percentage of students interested in mathematics increased from 27% in Evidence 1 to 88% in Evidence 2, indicating a 61% rise.

### **Comparison of Evaluations Between Evidence 1 and 2**

#### **Evidence 1**



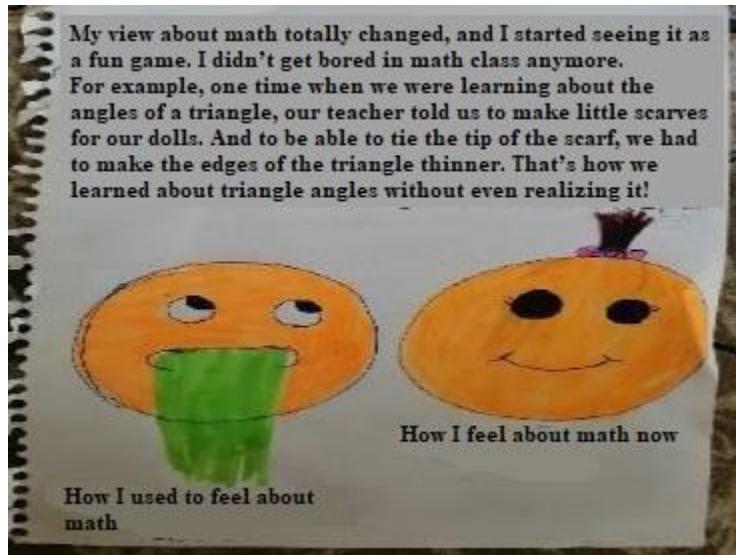
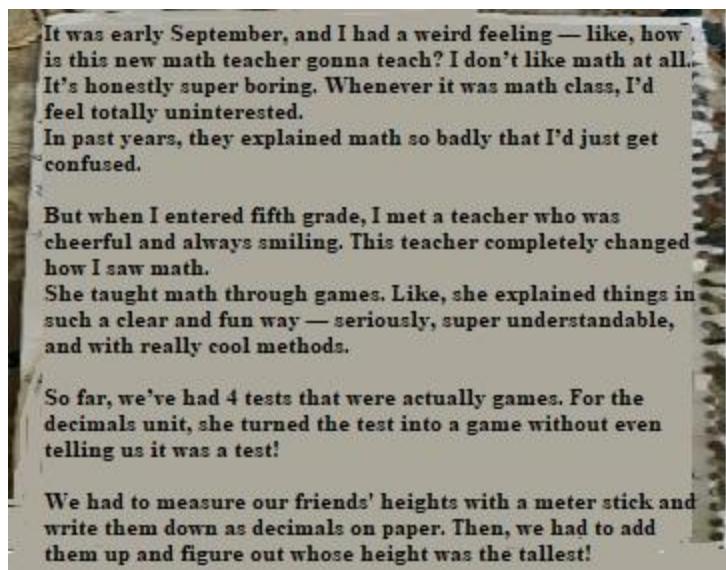
## Evidence 2



In Evidence 1, 9% of the students achieved a "Very Good" score, while in Evidence 2, this increased to 33%. The percentage of students receiving a "Good" score rose from 15% to 30%, showing a 15% increase. Those rated as

### Comparison of Students' Handwriting Notes in October and May:

"fair" went from 35% to 24%. Meanwhile, the percentage of students in the "more effort needed" group dropped from 44% to 3%, showing a significant improvement of 41%.



### Students' attitudes before and after the action research project

Based on the gathered evidence, the strategies implemented have proven effective, and these outcomes are likely to remain valid in the coming months. We have concluded that using games has successfully increased students' interest in mathematics, changed their attitudes positively, enhanced their patience, and noticeably reduced their fatigue levels.

### Discussion and Conclusion

Playing is a natural, enjoyable, and beloved activity for students, in which all of them

participate eagerly, motivated, and actively. Nowadays, teachers and instructors engage learners by using game-based teaching as an innovative and interactive instructional method. Instructional games are attractive and well-received by students, who engage in them without stress or anxiety, within an environment free of competition and fear of failure. Through these games, students learn educational concepts in a tangible manner with the highest quality. Combining educational goals with games can be considered highly beneficial because students voluntarily join the activity,

collaborating and interacting with one another, which promotes long-term retention of knowledge. Research by Jahangardi (2015) demonstrated that games, both directly and indirectly, facilitate achieving essential educational objectives across various topics, and they encourage active and effective learning. Games are not only capable of encompassing goal-oriented activities but also, when accompanied by academic content, the enjoyment resulting from playing becomes linked to the subject, increasing the child's enthusiasm for lessons. A study by Nikkhah et al. (2020) indicated that instructional games open new pathways in learning and have a significant impact on improving children's lives. Instructional games actively contribute to fostering creativity and enable better experience acquisition and mental application in problem-solving. Moreover, the research results highlight that play is the most natural tool for children's education and learning. Through playing, children learn, discover new things, recognize object properties, imitate adults' behaviors, and become familiar with their surrounding world.

One highly effective method for student learning across various age groups is the use of play to teach academic subjects. Students receive information during play with enjoyment and amusement, making the learning experience enjoyable. This game-based learning method increases interaction among students, thereby enhancing their social skills. Additionally, play causes other positive effects, such as recognizing cultural differences, fostering active learning, and understanding individual and cultural diversity. Given the importance of learning through play, the education system should emphasize this method more, and teachers should try to learn diverse instructional games for teaching various subjects to students.

Play in education is among the successful interactive methods of learning for students and learners. Learning combined with play helps students understand concepts practically and retain them mentally. Due to the cheerful environment and suitable instructional games, learners do not become fatigued in learning. Student interaction helps better learning and academic progress. The impact of play on children's learning is undeniable. Transform learning into a delightful process by using games.

Considering one of children's most essential needs and interests- playing- has a great effect on increasing learners' interest in lessons. Additionally, we found that strengthening visual and auditory memory, as well as developing students' attention and focus through purposeful games, greatly contributes to enhancing their interest in mathematics.

According to many educational philosophers, combining education with play strengthens social interaction, increases critical thinking and reasoning, deep and lasting learning, and problem-solving skills, and facilitates learning. Play also plays a crucial role in developing all aspects of a child. Educational environments can best provide spaces where students experience situations similar to real life, learn social communication and respect for others, boost their imagination, explore their surroundings, and solve problems. When teachers use play in teaching, it ensures the content is deeply embedded in students' minds, leading to enjoyable learning experiences, increased student interest, reduced fatigue and boredom, and a cheerful, worry-free learning atmosphere. We observed increased enthusiasm for mathematics through the use of games.

#### **Advantages and Limitations: Advantages of the Play Method:**

- Play is an experiential learning method, and students learn by doing during play.
- Play represents a part of reality.
- Play offers equal participation opportunities for all students in learning activities.
- Play has motivational value (Aghazadeh, 2009).
- It fosters imagination and satisfies curiosity.
- It fills free time.
- It generates joy and prepares children for other activities.

#### **Disadvantages of the Play Method:**

- It is difficult or unfeasible to implement in large classes.
- It is time-consuming.
- There may not be enough time available due to the extensive content.
- Experienced teachers familiar with this method are necessary for implementation (Ansari Ardali, 2018).

#### **Suggestions:**

1. It is suggested to use instructional games to improve the learning of mathematical concepts and increase interest; hence, instructional games should be used in the math teaching process.
2. Teachers should create a friendly and joyful classroom atmosphere so that students feel free to present their solutions without fear or anxiety, even if their answers are incorrect.
3. Schools should be equipped with suitable educational aids.
4. Elementary school teachers are suggested to present problems visually and minimize the use of mental problems.
5. Teachers should not underestimate the importance of games and should fully use them in their teaching

- because students' real-life experiences take shape through play.
- 6. Students should be asked to design games.
- 7. Timely identification and resolution of student problems should be done to prevent harm to students.
- 8. Timely encouragement should be used.
- 9. Patience is essential in supporting students.
- 10. Creativity and innovation should be used in teaching and assessment.
- 11. Individual differences should be considered in teaching.
- 12. Simple tools should be used for instructional games.

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