

# Application of Game Based Learning Model to Improve the Cognitive Ability of Grade V Students In Learning Mathematics on Fraction Material

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## Abstract

Mathematics is an important subject, but the reality in the field is that students' lack of interest has an impact on low learning achievement. Therefore, there is a need for innovative learning that can increase interest in mathematics. One of them is game-based learning. The use of games is an effective solution to overcome this problem. Games can make learning mathematics more fun and interactive. From an axiological perspective, games can bring out values such as sportsmanship, honesty, independence, creativity, and responsibility. This research aims to describe how digital games can be an effective tool in improving children's numeracy and reasoning skills. Through a comprehensive literature review, this research will qualitatively analyze how digital game mechanisms can facilitate the mathematics learning process. The results of the research conducted show that the use of games has a significant positive impact on the development of student competencies. High interactivity in games can increase students' intrinsic motivation and create a conducive learning atmosphere, which leads to improved student learning outcomes. From an axiological perspective, the use of games in learning has significant implications for the formation of students' character and values.

**Keywords:** mathematics, game based learning, fractions, axiology, qualitative.

## 1. Introduction

The progress of a nation is highly dependent on the quality of its education. Education plays a crucial role in developing individual potential, equipping them with the knowledge, skills, and noble values needed to build the country. This is in line with the National Education System Law Number 20 of 2003 which explains that education is organized consciously and directed to realize learning that develops the potential of students to have a religious personality, self-control, intelligence, personality, noble morals and skills. What is needed by individuals, society, nation and state.

Mathematics, as one of the fundamental subjects, is often a challenge for students. The concept of fractions, with its abstract nature, often makes it difficult for students to understand it. This study aims to test the effectiveness of the Game Based Learning (GBL) learning model in improving the cognitive abilities of fifth grade students in understanding the concept of fractions. By using a fun and interactive approach, GBL is expected to overcome students' learning difficulties and increase their learning motivation. The results of this study are expected to contribute to the development of more effective mathematics learning methods.

Technology developing very rapidly, especially in the field of education. Purposeful education to form intelligent and competent individuals. Learning process should help student develop potential and skills needed. Learning model based on technology the more popular. Use technology in learning offer Lots advantages, such as more learning innovative and interactive.

AT Tumiyang 2 Public Elementary School learning mathematics done Not yet use innovative teacher especially in grade 5 and in the lesson mathematics, still dominate it learning conventional make child not enough enthusiastic in learning mathematics so that need use enabling learning students. One of them is method learning game-based or Game Based Learning. It is expected with apply innovative learning will push the occurrence improvement activity Study students and employees Study student.

## 2. Research Methods

Study This aiming for understand understanding that has been There is previously about a Topic with method to study various relevant research. The methods used is review library.

### A. Procedure Search

Study This using data from books library and articles scientific discovery through search intensively on online platforms such as Google Scholar and ResearchGate. Data searches were conducted online during not enough more One month, namely at the beginning September to end September 2024.

### B. Procedure election

Researcher gather abstract from various article published scientific between 2020 to 2024 are relevant with the title of the researcher take. Researcher focuses on articles that discuss about How Implementation *Game Based Learning* (GBL) can used for increase ability student in control draft mathematics. After gather abstract, researcher read in a way careful For know whether contents article the in accordance with criteria that have been determined previously.

### C. Procedure Analysis

Information from the articles that have been collected, such as author name, year of publication, research location, research objectives, methods used, and research findings, are recorded systematically. After that, all of the data are analyzed in depth to find patterns, differences, or similarities between the various studies. Analysis results Then served in form A article new scientific.

## 3. Results and Discussion

There are several studies that have been conducted and are relevant to the problems faced, including :

### Research 1:

Sodikin, Gunawan Santoso, Adinda Herlia Putri in their research in 2024 showed that game -based learning methods provide a positive contribution in improving students' understanding of fractions. Students not only understand the concept of fractions better, but are also able to apply it in the context of everyday life. (Sodikin et al., 2024)

### Research 2:

Tri Bagoes Pranoto Sanjoyo, Ribut Prastiwi Sriwijayanti, Ani Anjarwati in their research in 2024 explained that the increase in learning outcomes where there were 12 students (85.71%) who completed and there were 2 students (14.28%) who had not completed with a classical average of 77.57. According to the study, the understanding of Student Learning per Cycle has an average value of 80. From this study, there is a significant influence on student understanding when the Puzzle media is applied using Game Based Learning. (Sanjoyo et al., 2024)

### Research 3:

The results of research by Chaterine Paulina, Siti Rokmanah, Ahmad Syachruroji in 2023 showed that the use of the Game-Based Learning model in mathematics learning in elementary schools can significantly improve students' understanding of mathematical concepts and learning motivation compared to conventional methods. In addition, students reported a higher level of satisfaction with mathematics learning with this approach. The results of this study indicate that the Game-Based Learning model has the potential to be an effective and interesting learning method in the context of mathematics learning in elementary schools. (Paulina et al., 2023)

### 3.1. Game Based Learning Method

Analysis to three article show that Game Based Learning (GBL) is approach learning innovative that combines element game in the learning process . GBL generally involving interesting learning so that can accepted by students . The implementation process learning with The GBL Game Based Learning method is carried out in a number of systematic stages , starting from stage planning until evaluation . Research results show that Game

Based Learning (GBL) is not only effective in increase motivation learn , but also have superiority compared to method learning conventional .

Steps application of learning models Game Based Learning (GBL) is as following :

- a. The teacher determines the topic or material of the game.
- b. Teachers prepare supporting facilities
- c. The teacher prepares instructions for implementing the lesson
- d. The teacher explains the goals, rules, and purpose of the game to the students.
- e. The teacher determines the duration of the game
- f. The teacher divides student become group or individual
- g. The teacher leads the learning process.
- h. The teacher gives a signal when the game time is up.
- i. The teacher asks students to report the results of the game.
- j. The teacher gives conclusions and evaluates students.

### ***3.2. The Use of Game Learning Media in Mathematics Subjects.***

In implementing the Game Based Learning method, it can be combined with innovative learning media that are in accordance with learning objectives.

### ***3.3. Advantages and Disadvantages of Game Based Learning (GBL) Method .***

Characteristics unique from every method learning , such as GBL, will produce different impacts on the learning process . Both advantages and also lack will appear in every method learning , following This advantages and disadvantages method learning Game Based Learning (GBL).

Excess

1. Increasing activities Study student so that child become interested in learning .
2. It is easier for students to absorb learning materials.
3. Students' impressions of learning are better because they consider learning to be fun.
4. There is interaction active students who encourage a sense of trust self student .
5. Push character positive like sportsmanship , honesty and responsibility answer .
6. Cultivate a sense of solidarity and togetherness among students.

Lack

1. Learning planning takes relatively longer because creating game concepts takes a lot of time.
2. There will be chaos if the teacher cannot do good classroom management.
3. Implementing learning requires extra energy because many tools are usually used.
4. The tendency to incur costs in game implementation.

### ***3.4. Analysis aspect axiological in Learning Model Game Based Learning (GBL)***

Axiology is a branch of philosophy that studies the nature of values. So the basis in the axiological level is what is the use of knowledge for? How is the relationship between scientific use and moral ethics? How is the determination of objects studied morally? How are scientific procedures and scientific methods related to moral rules? (Bahrum, 2013)

The axiological perspective offers a rich perspective for understanding the game world. If we view the game through lens axiological , we will see that game is not only just form entertainment only , but also a complex medium that carries as well as various values . Values This Can nature intrinsic , attached to the playing experience That alone , or extrinsic , which is related with benefit or more implications wide from activity playing games. With Thus , the analysis axiological allow We For dig deeper meaning in from a game, beyond pleasure solely .

The Values Contained In Game:

#### **1. Intrinsic Value**

Activity play that game Alone own values positive , such as fun , adrenaline rush moment face challenges , and the satisfaction that comes from it. when succeed finish mission or reach objective in game.

#### **2. Extrinsic Value**

Playing games is not only just entertainment . Activities this can also give contribution positive in development self , such as increase ability cognitive , expanding knowledge , and build relation social . Educational games , for example , are designed For practice brain in solve problem , while online games allow player For interact and collaborate with other people.

#### **3. Aesthetic Value**

The beauty that we feel moment play game, start from attractive visual display , pleasant sound heard , until a fascinating story .

#### 4. Moral values

Reflection moral and ethical values that are depicted in behavior character in games , as well as in interaction player with mechanism games .

Perspective axiological push We For look at video games as a rich medium values . With understand embedded values in the game, we can make more decisions intelligent and use the game as means learning as well as development self .

## 4. Conclusion

Analysis to three article study show that educational games are designed with use GBL method has great potential in improvement activity students and improvement to results Study students . Planning , implementation and evaluation process in learning game based is done with systematic steps . As in the implementation method other learning , learning models game based learning also has advantages and disadvantages . Research results show that educational game type This No only can increase ability think critical students , but also able to increase interest Study them . From the angle view axiological method learning game based offers method view to value . From the point of view view axiological Lots the values that we Can find Lots lesson valuable that can applied in life real . Games are not just entertainment, but can also be a means to develop oneself. By understanding the values contained in the game, we can use it as an effective learning tool. Games can teach us many things, from problem solving to teamwork.

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