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Journal of Elementary Education

Attadib: Journal of Elementary Education
Web Jurnal: https://ejournal.uika-bogor.ac.id/index.php/at-tadib/index
p-ISSN: 2614-1760, e-ISSN: 2614-1752

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 843-852

Analysis of Game-Based Learning Models in Mathematics Education at SDN Segara Makmur 01

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Abstract

This study aims to analyze the application of the game-based learning model in mathematics lessons in grade V at SDN Segara Makmur 01, Bekasi Regency. This study uses a qualitative approach and data collection through interviews, observations, and documentation. The results of the study show that the implementation of the game-based learning (GBL) model was carried out in several stages, namely the preparation stage for game-based mathematics learning, the implementation stage, and the evaluation stage. This model has been proven to be effective in increasing learning creativity. The increase in student creativity can be seen in their curiosity, fluency, flexibility, and originality.
Keywords: Game Based Learning; Learning; Mathematics.

Abstrak

Penelitian ini bertujuan untuk menganalisis penerapan model pembelajaran game based learning pada mata pelajaran matematika pada kelas V SDN Segara Makmur 01 Kabupaten Bogor. Penelitian ini menggunakan pendekatan kualitatif dan pengumpulan data yang dilakukan melalui wawancara, observasi, dan dokumentasi. Hasil penelitian menunjukkan bahwa implementasi model game based learning (GBL) dilakukan melalui beberapa tahap yaitu tahap persiapan pembelajaran matematika berbasis permainan, tahap pelaksanaan, dan evaluasi pembelajaran. Model ini terbukti efektif dalam meningkatkan kreativitas belajar. Adapun peningkatan kreativitas siswa dapat dilihat pada rasa ingin tahu (curiosity), kelancaran (fluency), keluwesan (flexibility), keaslian (originality).
Kata kunci: *Game Based Learning; Pembelajaran; Matematika.*

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INTRODUCTION

Advances in science and technology require learning processes to be more practical and interesting in order to improve the quality of education (Nasir, 2025; Sunardi et al., 2024). Innovative, new, and appropriate learning models can support students' understanding process, enabling them to apply the knowledge gained from their learning (C.-H. Chen & Tsai, 2021). Basically, mathematics is an important subject for students because it has many benefits in various aspects of life, as stated by Sidabutar & Firmansyah (2020).

Mathematics is an important subject in many fields and is very helpful in everyday life, especially in buying and selling. Elementary school mathematics has many learning topics. On average, students in this class experience difficulties in mathematics in algebra, because they feel that this material requires a lot of focus and precision, so that if there is an incorrect answer to a question, then the answer will be wrong until the end and they will have to reanalyze their mistakes. However, this study focuses on algebra because one of the learning objectives of mathematics in fifth grade is to master sequences and series, but many students face difficulties in learning this material because the representation of algebra is abstract, contains symbols and variables, and students still find it difficult. Therefore, this can be identified as a problem faced by students, especially in mathematics learning.

In addition, through interviews with teachers at SDN Segara Makmur 01 Elementary School in Bekasi Regency in October 2025, the researcher found that there were several obstacles in learning, especially for students and teachers. Many students do not pay close attention to learning in class because they find mathematics boring, and teachers continue to use lecture or conventional methods, which make learning less effective. In addition, many students still collect assignments outside the specified time.

Based on the results of observations conducted at SDN Segara Makmur 01 Elementary School in Bogor Regency, several problems were found. First, the mathematics learning activities usually used by teachers at SDN Segara Makmur 01 Elementary School still seem monotonous or use conventional learning methods. Second, in the learning process, teachers also have difficulty explaining the material to students, so that students find it difficult to absorb the information presented by the teacher properly. Third, during lessons, teachers rarely use learning media that can facilitate student learning. Based on interviews with teachers at SDN Segara Makmur 01, it was also stated that teachers do indeed find it difficult to develop digital media in their teaching process. In addition,

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teachers are more accustomed to using whatever media is available at school, making it difficult for them to develop media with new innovations. The results of interviews with students also stated that they find it difficult to learn without interesting innovations in digital media, which can reduce student learning, especially in mathematics.

This model uses brain-controlled technology to analyze the stress, excitement, relaxation, concentration, interest, and engagement experienced by students when completing a game-based learning approach (Pireva et al., 2019). This model uses novel visuals to learn language through reading and comprehension. A study found that groups who took courses using game-based pedagogy improved their learning outcomes and increased student engagement in the gamification process by adding "meaning" to game elements (Gupta & Goyal, 2022). Game-Based Learning (GBL) has been identified as an effective model for making learning more interesting, attractive, and active, compared to passive learning through textbooks or theory.

Therefore, there is a need for technology that can facilitate the learning process (Muller & Wulf, 2020). In this model, teachers are not only instructors but also facilitators who can be guided by students and their learning, so that students can master the learning material. This is also one way for teachers to encourage the achievement of effective learning objectives by utilizing learning aids or media. Learning media is an appropriate tool for students to use to facilitate effective understanding of the material (Gogahu & Prasetyo, 2020; Herliana & Anugraheni, 2020).

One thing that can improve student mathematics learning is the Game-Based Learning (GBL) model. The Game-Based Learning (GBL) model focuses more on learning objectives and learning styles, not just on learning content (Saksrisathaporn, 2020). Game-based learning means not only creating games for students, but also designing learning activities that can gradually introduce concepts and guide users to the final goal. Students do not only listen to the teacher's explanations in class, but also observe videos or photos and then demonstrate them (Kurniawati & Koeswanti, 2021). The Game-Based Learning (GBL) model requires teachers to be able to utilize rapidly developing technology to keep up with the times.

Based on the above issues, the researcher was interested in conducting a study or research entitled Analysis of the Implementation of the Game-Based Learning Model in Mathematics Learning in Grade V at SDN Segara Makmur 01, Bekasi Regency.

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RESEARCH METHODS

This study uses a qualitative approach that prioritizes understanding the processes and meanings behind an event. The approach used is a case study, which allows researchers to conduct an in-depth investigation of a particular phenomenon by applying various detailed information gathering procedures over a specified period of time. The research design follows the general stages of qualitative research, namely the preparation, implementation, analysis, and conclusion stages. In the preparation stage, the researcher conducted a literature study and prepared observation instruments and interview guidelines. The implementation stage was carried out through direct observation and interviews with teachers and students. Meanwhile, the data analysis stage began from data collection to the final interpretation process.

The data collection methods in this study included interviews, direct observation of students, and documentation studies as supporting evidence. The object of this study was fifth-grade students at SDN Segara Makmur 01 Elementary School in Bogor Regency. Interviews were conducted with key informants, including mathematics teachers and students. Direct observation of the learning process and documentation studies were conducted as supporting evidence by observing the application of the game-based learning (GBL) model in fostering student motivation and creativity in mathematics in grade V at SDN Segara Makmur 01 Elementary School in Bekasi Regency. To ensure the validity of the field data, a validation test was conducted using triangulation techniques, which also served to consolidate the results from the various data collection methods used.

RESULTS AND DISCUSSION

Based on direct observation and interviews, the findings of this study indicate that the GBL learning model has great potential to improve the quality of learning in the classroom, especially in terms of student creativity and engagement. However, its implementation requires guidance, training, and adaptation in accordance with the conditions and characteristics of each school and student.

According to Arrahman, T., et al (2024), the Game Based Learning (GBL) model is an innovation in education that combines learning and playing. This approach integrates game elements into learning activities, making the learning process more interesting, interactive, and enjoyable for students. Meanwhile, Aoliyah (2023) explains that Game-

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Based Learning (GBL) is a learning method that utilizes game components in educational activities.

The learning process was conducted through one meeting in classes V.A and V.B in mathematics lessons at SDN Segara Makmur 01, Bekasi Regency. The learning model was implemented based on Game-Based Learning using the Bamboozle game. Based on the results of observations, interviews, and documentation conducted during the learning process, there was a positive impact on learning motivation and active involvement in understanding Number Patterns material. The findings of this study state that Game-Based Learning is an effective approach to increase student involvement because it provides a fun, challenging, and contextual learning experience.

The active learning aspect, namely the GBL Game-Based Learning model, encourages students to think, discuss, collaborate, and solve problems, which are the core of the active learning approach. The game activities carried out make students not only recipients of information but also active participants in the learning process. Photo documentation and student work results support the findings from observations and interviews, showing that students actively collaborated when working on problems according to the problem cards they received.

Based on research data documented at SDN Segara Makmur 01 Elementary School in Bekasi Regency, the results of this study are data obtained using a game-based learning model:

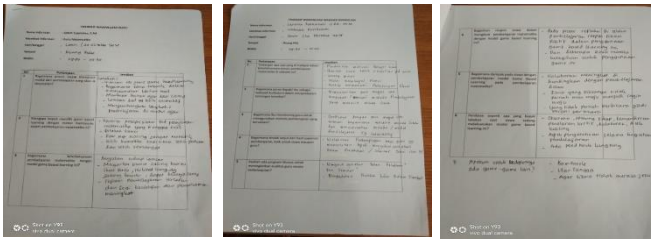

Figure 1. Interview Instrument

This game-based learning model has evolved into an innovative strategy that has proven to be effective, particularly in supporting student engagement in the learning process, especially in solving math problems.

By combining engaging and interactive game elements, this approach not only encourages active participation from all students, but also helps them understand complex concepts in a more accessible way. This enjoyable and flexible learning experience

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allows students to learn at their own pace, while building their confidence and ability to solve problems independently.

In implementing the GBL (Game Based Learning) model in mathematics learning in fifth grade, there are several stages based on clear data. Researchers focus on Game Based Learning model data. This includes preparing game-based mathematics learning, implementing the model, and evaluating mathematics learning using the Game Based Learning model. Preparing Mathematics Learning with the GBL (Game Based Learning) Model. Before applying the Game Based Learning (GBL) model in mathematics, teachers carry out a preparation stage. This includes formulating the objectives and benefits of the game, determining the type of game, determining the space and place to play, and preparing the necessary tools and materials. Fifth-grade teachers create teaching modules, which are usually made at the beginning of the semester, once every semester at the beginning of the semester. The teaching modules are compiled by integrating all teaching materials directly.

The implementation of the Game-Based Learning model in fifth-grade mathematics learning is basically similar to the conventional teaching and learning process. However, the use of the game method is the main difference, as it successfully increases student interest and engagement. There are several games available in the game method, but the teacher uses card games in this learning activity.

Implementation of Game-Based Learning Model using card games. This is in line with the students' statement that they enjoy learning mathematics through games. The implementation of this mathematics learning process refers to learning about polygons.

Based on the research results, the learning process can be described in three main steps: pre-play activities, play activities, and closing activities. Based on the results of the implementation of the game-based learning model studied, it was found that student learning outcomes improved in several aspects, including:

1. Cognitive aspect (knowledge)

   With the implementation of the game-based learning model in mathematics learning, the learning process of students improved.
2. Affective aspect (attitude)

   Based on the researcher's study, the application of card games improved student learning in the affective aspect. This can be seen from the enthusiasm of students who do warm-ups or ice breaking before starting the game.
3. Psychomotor aspect (skills)

   From the results of the study conducted by the researcher, the application of the

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game-based learning model improves student learning outcomes. This can be seen from their ability to play games skillfully and their speed in playing well.

From the initial observations that have been made, the learning process of students has improved during the teaching and learning activities with the application of game-based learning. This indicates that there has been an improvement in student learning in mathematics on the subject of "Sequences and Series" in grade V at SDN Segara Makmur 01 in Bekasi Regency.

The improvement in student learning can be seen as follows:

1. Curiosity

   Students' ability in game activities makes them very interested so that when the game is played, they want to touch, hold, and manipulate teaching aids or concrete objects in the form of polygons. For students, this sensorimotor exploration is a tangible manifestation of deep curiosity. One of the main signs of creativity in learning is curiosity, which indicates motivation to explore, ask questions, and discover new things that were previously unknown (Hidayati and Restian, 2023).

2. Fluency

   During Game Based Learning activities such as "Cards" in Number Patterns, students demonstrated fluency in producing various forms of Number Patterns. The results of the observation indicated that most students were able to have a positive impact on learning motivation and active involvement in understanding Number Pattern material.

3. Flexibility

   Students demonstrated flexible thinking, especially when asked to arrange certain objects from Number Patterns. The results of the observation showed that students had an effective approach to increasing student engagement, as it provided a fun, challenging, and contextual learning experience.

4. Originality

   Students' creativity is evident in the way they form objects that were not previously thought of. For example, there are students who arrange rows and series of numbers in number patterns and encourage students to think, discuss, collaborate, and solve problems, which is the core of the active learning approach.

According to Lestari & Zakiah (2019), the application of GBL in mathematics learning provides students with real opportunities to develop their creativity. By using games, students can express their ideas through curiosity, fluency, flexibility, and originality, which in turn can make mathematics learning a creative and enjoyable

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thinking process.

The implementation of the game-based learning (GBL) model with games in fifth-grade mathematics lessons at SDN Segara Makmur 01 Elementary School in Bekasi Regency was carried out regularly. This process included comprehensive planning (from preparation to evaluation), implementation of activities, and determination of clear objectives for each activity.

First, the implementation/planning stage. In the preparation stage, the teacher creates teaching modules, then refers to the creation/content of the teaching modules and formulates/designs the expected objectives. *Second*, the implementation stage. This stage includes pre-play activities, play activities, and closing activities. The initial activities before play focus on preparing the students and the tools and materials to be used. During the play session, the teacher's role is to observe and guide the students so that the activities run according to the instructions. The final activities include asking each group/individual to explain the shapes they have made. Then, they discuss the differences and similarities between the shapes.

Third, the evaluation stage. This stage shows progress in several aspects of learning: 1). Cognitive Aspect: There was an increase in student assessment with the implementation of mathematics learning using the game-based learning model, the role of teachers in learning as facilitators who provided guidance related to game rules, student responses to learning were very enthusiastic, they were serious in following the learning, student involvement in learning was overall, and classroom management carried out by teachers was divided into several groups, as well as post-learning reflection. 2). Affective Aspect: Students' responses to mathematics learning with the game-based learning model showed that they were enthusiastic about participating in learning, were serious, were very actively involved, and were very excited to use the game method again after the implementation of game-based learning. 3). Psychomotor Aspect: The impact on students with game-based learning in mathematics learning is that after the implementation of game-based learning, students can better understand the material through the practices they do. Students are enthusiastic and eager to return to learning using game-based learning, as seen from their skilled ability in playing the game.

Through game-based learning, the learning process is supported by the use of games that have been specifically designed for this purpose. The implementation of game-based learning creates an environment that motivates, is enjoyable, and enhances student creativity, especially among students. The game-based learning approach is able to stimulate children's cognitive, affective, and motor development.

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CONCLUSION

Based on the results of observations, interviews, and documentation conducted during the learning process, there was a positive impact on learning motivation and active involvement in understanding Number Patterns material. The findings of this study state that game-based learning is an effective approach to increasing student engagement, as it provides a fun, challenging, and contextual learning experience at SDN Segara Makmur 01 in Bekasi Regency.

Based on the conclusions outlined above, several suggestions can be made for teachers, especially those at SDN Segara Makmur 01 in Bekasi Regency, to be more varied in using learning models in teaching. In terms of subject matter, it is very possible to obtain satisfactory student learning outcomes if the appropriate learning model is used. The principal should ensure that teachers have the ability to apply various learning models and methods. Students should master the material that has been provided so that they have sufficient knowledge, because the subject matter is structured in levels according to difficulty, from elementary to high school. Researchers who wish to conduct similar research should involve other variables, expand the research object, and consider psychological factors such as interest, attitude, motivation, learning style, and so on, so that it is not solely based on the use of learning methods.

Thus, this study confirms that in order to improve mathematics learning outcomes in the subject of Number Patterns, the game-based learning (GBL) model can be used so that learning can be implemented with better results. It can be recommended that the game-based learning (GBL) method can be applied in learning activities.

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