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Application of the Quizizz Assisted Discovery Learning Model to Improve Mathematics Learning Outcomes of Grade III Students of SD Negeri 001 Bonai Darussalam

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A B S T R A C T

Mathematics learning in elementary schools has an important role in building understanding of concepts, but classroom practice still tends to be teacher-centered, so student learning outcomes are low. This research aims to improve Mathematics learning outcomes through the application of the Quizizz-assisted Discovery Learning model in grade III students of SD Negeri 001 Bonai Darussalam. The research used the Kemmis and McTaggart model of Classroom Action Research which was carried out in two cycles involving 23 students. Data was collected through learning outcome tests and observation of learning activities, then analyzed in a quantitative descriptive manner. The results showed an increase in the average score from 61 (35% completeness) in the pre-cycle to 76 (70%) in the first cycle and 93 (100%) in the second cycle. It was concluded that the integration of Discovery Learning and interactive digital evaluation was effective in improving students' understanding of concepts and learning engagement.

Keywords: *Discovery Learning, Quizizz, Math Learning Outcomes, Classroom Action Research, Elementary School*

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INTRODUCTION

Education is a planned process that aims to develop the potential of students optimally, both in the cognitive, affective, and psychomotor realms. At the elementary school level, Mathematics learning has a very important position because it plays a role in forming logical, systematic, analytical, and problem-solving skills as the basis for mastering other disciplines. Therefore, the quality of Mathematics learning needs to receive serious attention in order to be able to support the achievement of 21st century competencies(Alfiyah et al., 2021).

However, various studies show that the learning outcomes of Mathematics students in elementary school in Indonesia are still relatively low. Students often have difficulty in understanding basic concepts, especially in number operations and contextual problem solving, because learning tends to be oriented towards memorizing procedures and lacking development of high-level thinking skills. This condition shows the need for innovation in the learning process so that the understanding of concepts becomes more meaningful (Sari et al., 2021).

This problem was also found at SD Negeri 001 Bonai Darussalam. Based on the results of initial observations made by researchers on grade III students, the Mathematics learning process is still dominated by lecture methods and routine problem exercises. Teachers act as information centers, while students receive more material passively. The learning interactions that occur have not fully encouraged students to actively ask questions, discuss, or discover concepts independently.

In addition, the learning that takes place is still oriented towards solving problems mechanically without associating the concept with contextual situations that are close to students' lives. This has an impact on low conceptual understanding and lack of confidence in

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students in solving various mathematical problems. Low motivation to learn and the lack of use of innovative learning media also strengthen this problem.

To strengthen these empirical conditions, an analysis was carried out on the learning outcomes of grade III students as shown in Table 1 below.

Table 1 Mathematics Score Data for Grade III Students of SDN 001 Bonai Darussalam

The KKTP set by the school	Number of all students	Accomplished students	Percentage of students who complete	Students who have not completed	Percentage of students who have not completed
75	23	8	35%	15	65%

Based on the data in Table 1, out of 23 students, only 8 students (35%) have achieved completeness according to KKTP 75, while 15 students (65%) have not completed it. This percentage shows that classical completeness has not been achieved because in general the minimum expected standard is ≥75%. This condition illustrates the gap between the actual achievement (Dasein) and the expected learning target.

Normatively (Das Sollen), Mathematics learning should place students as active subjects who build understanding through hands-on learning experiences. The teacher functions as a facilitator who guides students in the process of exploration, hypothesis submission, data collection, and conclusion drawn. One of the learning models that is in line with this principle is *Discovery Learning* which consists of stages of stimulation, problem identification, data collection, data processing, verification, and generalization (Moko et al., 2022).

A number of studies support the effectiveness *of Discovery Learning* in improving the quality of Mathematics learning in elementary schools. (Nurhaliza & Rahayu, 2022) stated that this model is able to improve students' critical thinking skills because they are actively involved in the concept discovery process. (Fitriana, 2023) also found that discovery-based learning contributes to increased concept retention and student confidence because understanding is gained through hands-on learning experiences.

However, the application of innovative models needs to be supported by learning media that can increase student motivation and involvement. In the context of technology-based learning, the use of *Quizizz* as an interactive medium has been shown to increase learning motivation through the provision of direct feedback and a fun element of competition. Wulandari & Pratama (2024) explained that game-based learning approaches such as (Trisyana et al., 2025) *Quizizz* help students understand the material more deeply because it demands accuracy and speed of thinking. (Setyowati & Mulyadi, 2024) added that the integration of digital media in mathematics learning can create a more contextual learning experience.

Based on the analysis of empirical conditions and theoretical foundations, an action to improve learning through Classroom Action Research (PTK) is needed. The integration of *the Discovery Learning* model assisted *by Quizizz* is seen as an alternative solution to improve the learning outcomes of Mathematics students in grade III of SD Negeri 001 Bonai Darussalam. Through the cycle of planning, implementation of actions, observation, and reflection, it is hoped that there will be an increase in students' active participation and classical learning completeness.

Thus, this study is implicitly directed to examine how the application of the *Quizizz-assisted* Discovery Learning *model* in Mathematics learning in grade III of SD Negeri 001 Bonai Darussalam, and the extent to which the application of these actions can gradually improve student learning outcomes until they reach the expected completeness.

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METHOD

This research is a Class Action Research (PTK) which refers to the spiral model of Kemmis and McTaggart (1988), which consists of four stages in each cycle, namely planning, implementation of actions, observation, and reflection. This model was chosen because it allows for gradual and continuous improvement of learning through a reflective cycle of action.

The research was carried out at SD Negeri 001 Bonai Darussalam, Bonai Darussalam District, Rokan Hulu Regency, Riau Province, in the odd semester of the 2025/2026 school year (January – March 2026). The subjects of the study were all grade III students totaling 23 people, consisting of 12 male students and 11 female students. The selection of subjects uses the total sampling technique because all students in the class are used as action subjects.

The research was carried out in two cycles. Each cycle consists of two learning meetings and one end-of-cycle evaluation. In the planning stage, the researcher compiled learning tools in the form of Teaching Modules based on *the Discovery Learning* model, compiled grids and learning outcome test instruments, designed interactive evaluation media using *Quizizz*, and prepared observation sheets for teacher and student activities.

The implementation stage of action is carried out by applying *the Discovery Learning* syntax which includes: (1) stimulation, (2) problem identification, (3) data collection, (4) data processing, (5) verification, and (6) generalization. *Quizizz media* is used at the stage of evaluation and reinforcement of the material to increase motivation and provide direct feedback to students. In cycle II, action improvements were made based on the results of reflection in cycle I, especially in the aspects of time management, provision of contextual stimulus, and increased student participation in group discussions.

Observations are carried out during the learning process to observe the teacher's activities in applying the learning model and student activities during the learning process. Reflection is carried out at the end of each cycle by analyzing test results and observation data to determine the effectiveness of actions and improvements in the next cycle.

The research instruments include: (1) learning outcome tests in the form of objective questions to measure students' cognitive achievements, (2) teacher activity observation sheets, (3) student activity observation sheets, and (4) learning activity documentation. The validity of the content of the instrument is consulted with peer teachers to ensure its conformity with the learning competency indicators. Data collection techniques are carried out through tests, observations, and documentation. The learning outcome data was analyzed using quantitative descriptive techniques by calculating the percentage of learning completeness using the formula:

$$S = \frac{R}{N} \times 100\%$$

Where S is the percentage of student learning outcomes, T is the score obtained, and N is the maximum score. The percentage results are then categorized based on the following criteria:

Table 2. Learning Completeness Criteria

Percentage	Category
80- 100	Excellent
66 – 79	Good
56 – 65	Enough
40 – 55	Less
< 40	Very Less

If after cycle II the percentage of completeness has reached ≥80% with a minimum score of 75, then the research is considered successful and stopped. If not, further reflection is carried out to determine the next step.

The analysis of the results of teacher and student observations was carried out to evaluate the extent of the implementation of the *Quizizz* Assisted Learning Discovery model. Teacher and student observation data is determined based on the following criteria:

$$P = \frac{\sum X}{N} \times 100\%$$

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Where P is the percentage of learning implementation, ∑X is the score obtained from the observation sheet, and N is the maximum score that can be obtained. The categories of observation results of teachers and students are determined based on the following criteria:

Table 3. Criteria for Teacher and Student Activity

Percentage	Category
86- 100	Excellent
76 – 85	Good
60 – 75	Enough
55 – 59	Less
< 54	Very Less

The implementation of learning is declared effective if the activities of teachers and students are in the good or very good category. The analysis was carried out by comparing the improvement of learning outcomes and learning activities in each cycle to assess the success of the actions.

FINDINGS AND DISCUSSION

This classroom action research aims to comprehensively analyze the improvement of Mathematics learning outcomes of grade III students of SDN 001 Bonai Darussalam through the application *of the Discovery Learning* model combined with Quizizz interactive evaluation media. The analysis focused on the development of the average score and the percentage of learning completeness at each meeting and each cycle. Quantitative data is used as the main indicator of the success of the action, while the results of observation of teacher and student activities serve as supporting data to strengthen the interpretation of the changes that occur during the learning process.

Before the action is given, initial observations are carried out to find out the basic conditions of student learning achievements. The average score at this stage is 61, which indicates that most students have not reached the set completion criteria. This condition is the basis for the need to implement learning improvement measures through a model that emphasizes the active involvement of students in finding concepts.

Improvement of Learning Outcomes in Cycle I

Cycle I is the initial stage of implementation of the action. In the first meeting, learning was carried out according to *the Discovery Learning syntax*, starting from the stimulation stage to drawing simple conclusions. To find out the initial impact of the application of the model, an evaluation of learning outcomes was carried out which is summarized in Table 4 below.

Table 4. Student Learning Outcomes of the first cycle of the first meeting of grade III SDN 001 Bonai Darussalam

No	Student Name	KKTP	Value	Remarks
1	ARP	75	80	Tuntas
2	AFK	75	60	Incomplete
3	AHP	75	75	Tuntas
4	FROM	75	80	Tuntas
5	AHZ	75	55	Incomplete
6	AML	75	50	Incomplete
7	AN	75	80	Tuntas
8	DAP	75	75	Tuntas
9	DS	75	65	Incomplete
10	F	75	60	Incomplete
11	FSG	75	65	Incomplete
12	GG	75	85	Tuntas
13	JZ	75	85	Tuntas

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14	JKD	75	75	Tuntas
15	SOUTH	75	65	Incomplete
16	JNS	75	85	Tuntas
17	KAZ	75	55	Incomplete
18	MF	75	85	Tuntas
19	MHS	75	65	Incomplete
20	NB	75	65	Incomplete
21	RIM	75	80	Tuntas
22	SPB	75	65	Incomplete
23	SL	75	65	Incomplete
Total Values				**1620**
Average				**70**
Tuntas				**11**
Incomplete				**12**
Percentage Completion				**48%**
Incomplete Percentage				**52%**

Based on Table 4, an average class of 70 was obtained with a completion percentage of 48% or 11 out of 23 students who achieved a score of ≥ 75. This data shows that despite the improvement compared to the initial observation, some students still have difficulty understanding concepts independently. This indicates that students are still in the stage of adjusting to the invention-based learning pattern that demands activeness and analytical skills.

Based on the results of reflection on the first meeting, improvements were made at the second meeting in the same cycle. Teachers provide more systematic direction at the stage of problem identification and data processing, as well as clarify sample questions before students explore independently. The impact of these improvements can be seen in the results of the evaluation presented in Table 5 below.

Table 5. Learning Outcomes of Student Cycle I Meeting II Grade III SDN 001 Bonai Darussalam

No	Student Name	KKTP	Value	Remarks
1	ARP	75	80	Tuntas
2	AFK	75	75	Tuntas
3	AHP	75	80	Tuntas
4	FROM	75	85	Tuntas
5	AHZ	75	60	Incomplete
6	AML	75	55	Incomplete
7	AN	75	90	Tuntas
8	DAP	75	80	Tuntas
9	DS	75	75	Tuntas
10	F	75	65	Incomplete
11	FSG	75	75	Tuntas
12	GG	75	90	Tuntas
13	JZ	75	90	Tuntas
14	JKD	75	85	Tuntas
15	SOUTH	75	60	Incomplete
16	JNS	75	90	Tuntas
17	KAZ	75	65	Incomplete

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18	MF	75	85	Tuntas
19	MHS	75	75	Tuntas
20	NB	75	65	Incomplete
21	RIM	75	80	Tuntas
22	SPB	75	75	Tuntas
23	SL	75	65	Incomplete
Total Values				**1745**
Average				**76**
Tuntas				**16**
Incomplete				**7**
Percentage Completion				**70%**
Incomplete Percentage				**30%**

At the second meeting, the average class increased to 76 with a completion percentage of 70%. This increase shows a positive response from students to improving learning strategies. However, there are still seven students who have not reached completion, so the actions in the first cycle are considered not fully optimal and need to be continued to the next cycle.

Improvement of Learning Outcomes in Cycle II

Cycle II is designed based on the results of reflection in cycle I with an emphasis on strengthening the stages of verification and generalization of concepts. In addition, the use of *Quizizz* is optimized as a formative evaluation tool that provides direct feedback to students. The results of the evaluation in the second cycle of the first meeting can be seen in Table 6 below.

Table 6. Learning Outcomes of Cycle II Student Meeting I Grade III SDN 001 Bonai Darussalam

No	Student Name	KKTP	Value	Remarks
1	ARP	75	85	Tuntas
2	AFK	75	80	Tuntas
3	AHP	75	90	Tuntas
4	FROM	75	85	Tuntas
5	AHZ	75	60	Incomplete
6	AML	75	60	Incomplete
7	AN	75	90	Tuntas
8	DAP	75	85	Tuntas
9	DS	75	85	Tuntas
10	F	75	75	Tuntas
11	FSG	75	85	Tuntas
12	GG	75	90	Tuntas
13	JZ	75	95	Tuntas
14	JKD	75	85	Tuntas
15	SOUTH	75	85	Tuntas
16	JNS	75	95	Tuntas
17	KAZ	75	75	Tuntas
18	MF	75	90	Tuntas
19	MHS	75	80	Tuntas
20	NB	75	65	Incomplete
21	RIM	75	90	Tuntas

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22	SPB	75	80	Tuntas
23	SL	75	75	Tuntas
Total Values				**1885**
Average				**82**
Tuntas				**20**
Incomplete				**3**
Percentage Completion				**87%**
Incomplete Percentage				**13%**

The data in Table 6 shows a significant increase with the grade average reaching 82 and the completion percentage of 87%. This increase indicates that improved learning strategies have a real impact on improving student understanding. Quick feedback from *Quizizz* helps students identify mistakes directly and correct them at the same time.

The most optimal improvement occurred in the second cycle of the second meeting which became the final stage of the research. The evaluation at this stage aims to ensure whether all students have achieved the targeted competencies. The full results are presented in Table 7 below.

Table 7. Student Learning Outcomes of the second cycle of the second grade meeting of SDN 001 Bonai Darussalam

NO	Student Name	KKTP	Value	Remarks
1	ARP	75	90	Tuntas
2	AFK	75	85	Tuntas
3	AHP	75	95	Tuntas
4	FROM	75	95	Tuntas
5	AHZ	75	80	Tuntas
6	AML	75	75	Tuntas
7	AN	75	100	Tuntas
8	DAP	75	95	Tuntas
9	DS	75	95	Tuntas
10	F	75	85	Tuntas
11	FSG	75	100	Tuntas
12	GG	75	95	Tuntas
13	JZ	75	100	Tuntas
14	JKD	75	95	Tuntas
15	SOUTH	75	100	Tuntas
16	JNS	75	100	Tuntas
17	KAZ	75	90	Tuntas
18	MF	75	100	Tuntas
19	MHS	75	95	Tuntas
20	NB	75	80	Tuntas
21	RIM	75	95	Tuntas
22	SPB	75	95	Tuntas
23	SL	75	95	Tuntas
Total Values				**2135**
Average				**93**
Tuntas				**23**
Incomplete				**0**

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Percentage Completion	**100%**
Incomplete Percentage	**0%**

Table 7 shows that all students (100%) have achieved completeness with the average class increasing to 93. This achievement indicates that the measures implemented have been comprehensively successful. The improvement does not only occur in the quantitative aspect in the form of grades, but also in the ability of students to understand and apply concepts more systematically.

Improvement Recapitulation and Visualization

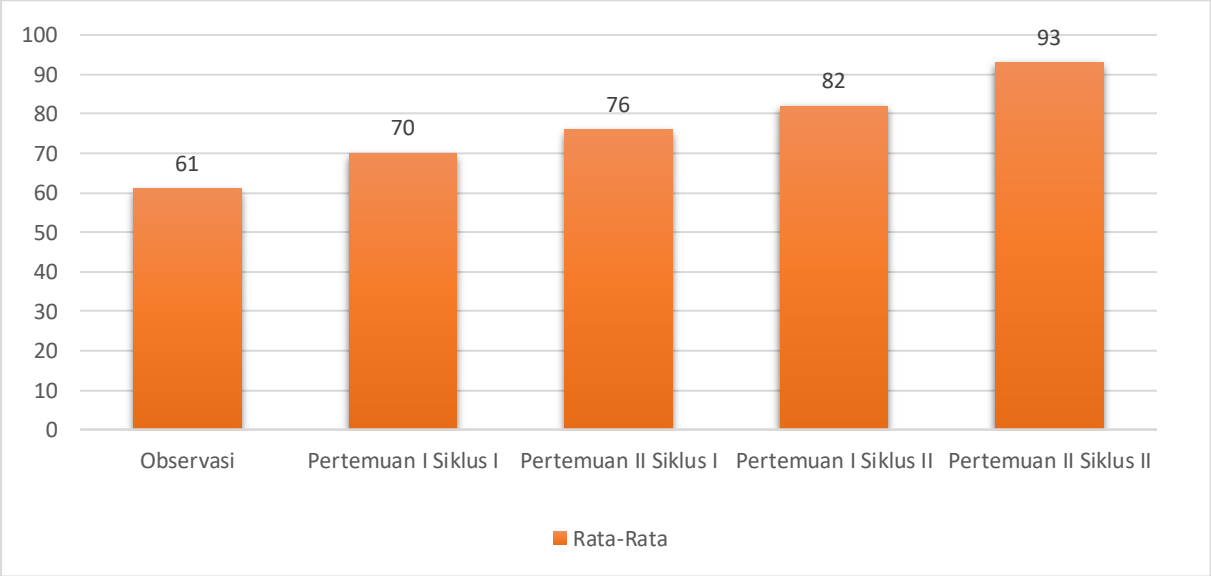
To obtain a comprehensive overview of the development of learning outcomes, a recapitulation of the achievement of completeness was carried out at each stage of action. The summary can be seen in Table 8 below.

Table 8. Recapitulation of Student Learning Outcomes in cycles I and II of SDN 001 Bonai Darussalam

Yes	Cycles	Meeting I		Meeting II	
		Completed Students	Students are not complete	Completed Students	Students are not complete
1	Pre-Cyclic				
2	Cycle I	11 Students	12 Students	16 Students	7 Students
3	Cycle II	20 Students	3 Students	23 Students	0 Students

The recapitulation in Table 8 shows a consistent upward trend, starting from 48% in the first cycle of the first meeting, increasing to 70%, then 87%, until reaching 100% at the end of the second cycle. This pattern shows that the mechanism of reflection and continuous improvement in classroom action research is effective in improving the quality of learning.

In addition to the table, the development of students' average scores is also visualized through graphs to clarify the pattern of improvement that occurs over time. This visualization helps to illustrate the average comparison at each stage in a more systematic way.



Graph 1. Improved Learning Outcomes

Based on the graph, the average score gradually increased from 61 in the initial observation stage to 70 and 76 in cycle I, then rose to 82 and finally 93 in cycle II. The difference in improvement from the initial condition to the end of the study reached 32 points, which showed a significant improvement in student learning achievement.

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As supporting data, teacher and student activities during the learning process have also increased. The recapitulation of the results of the observations is presented in the following Table 9.

Table 9. Recapitulation of Teacher and Student Activities Cycle I and Cycle II

Yes	Observations	Cycle I		Cycle II	
		Meeting I	Meeting II	Meeting I	Meeting II
1	Teacher Activities	38%	53%	85%	100%
2	Student Activities	33%	45%	75%	95%

The data shows that the improvement of learning outcomes goes hand in hand with the improvement in the quality of learning activities. Teacher activity increased from 38% to 100%, while student activity increased from 33% to 95%. This shows that students' active involvement in discovery-based learning contributes directly to improved understanding of concepts.

Overall, the findings of this study confirm that the application of *the Quizizz-assisted* Discovery Learning *model* is effective in gradually and sustainably improving the learning outcomes of Mathematics students in grade III. The integration of discovery-based learning strategies with interactive evaluation media has been proven to be able to improve classroom dynamics while increasing the average score and completion percentage in each cycle. The improvement shows that a structured discovery process, accompanied by instant feedback, contributes to strengthening students' understanding of concepts and active engagement.

These findings are consistent with the results of a study that concluded that (Khasanah & Lestari, 2021) *Quizizz-assisted* Discovery Learning was able to significantly improve mathematics learning outcomes through a pattern of gradual increases between cycles. In line with that, it was also found that the integration (Krisna et al., 2025) *of Quizizz* in active learning had a positive impact on student understanding and participation. The implications of this improvement pattern emphasize the importance of optimizing the stimulation, verification, and generalization stages, as well as providing differential assistance so that all students achieve the expected competencies. This affirmation is in line with findings that show that (Fredy Oktafrizal et al., 2025) *the structure of the Discovery Learning* process contributes significantly to improving students' thinking skills and concept retention.

CONCLUSION

The application of *the Discovery Learning* model combined with Quizizz-based interactive evaluation has proven to be an effective approach to strengthen students' understanding of mathematical concepts, as it is able to encourage active involvement through the process of problem identification, concept exploration, verification of findings, and independent reflection on the understanding obtained. The integration of the two strategies allows teachers to manage learning in a more targeted and systematic manner, while students get a more meaningful learning experience through technology-based discovery and evaluation activities. Thus, this approach is recommended to be applied in a sustainable manner, accompanied by strengthening at the stimulation, verification, and generalization stages as well as providing differential assistance for students who need additional support, so that all students have the same opportunity to achieve the targeted competencies and can develop learning independence optimally.

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