Implementation of the Guided Inquiry Model Based on Big Book Media to Improve the Mathematics Learning Process and Outcomes in Grade IV of SDN 05/II Air Gemuruh

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Abstrak

This classroom action research wasconducted on 26 fourth-grade students at SDN 05/II Air Gemuruh. Based on initial observations, it was found that the learning process and outcomes of the participantswere still lacking. This was due to the fact that the learning process did not fullyfollow the principles of the independent curriculum, and the average test scores were still below the school's minimum passing grade of 75. This study applied the PTK method, which consisted of twocycles, each covering the stages of planning, implementation, observation, and reflection. The findings of the study showed that the application of the guided inquiry model based on big book media in data compilation material was very successful. Teacher performance increased from 90.95% in cycle I to 100% in cycle II. Student participation also increased from 71.16% to 95.08%, exceeding the success target of 75%. In terms of learning outcomes, student mastery increased from 69.23% (average score of 75) in cycle I to 92.30% (average score of 84.62) in cycle II. Overall, there was anincrease of 23.07% from the beginning to the end, which shows that the guided inquiry model based on big books was successful in improving student learning outcomes on the topic of fractions

1 Introduction

The Merdeka curriculum is an educational approach that gives schools, teachers, and students more autonomy in designing, managing, and evaluating the learning process (Dian Fitra, 2023). According to Milah et al. (2015), learning mathematics means that learning is a process of behavioral or performance change through a series of activities, such as reading, observing, listening, and imitating. The goal of learning mathematics in elementary school is to master many concepts, enabling individuals to solve problems better, because solving problems requires rules, and these rules are based on the concepts possessed (Abdul, 2023).

According to Setiawan Usep, et al. (2023), the learning process is an activity carried out by two parties, namely the teacher as a facilitator and the student as an intermediary to convey cognitive, affective, and psychomotor messages. According to Yandi et al. (2023), learning outcomes are the results achieved by students after receiving instruction within a certain period of time. Learning outcomes are the acquisition of learning values by students, which include three types of knowledge, namely intellectual, skills, and attitudes (Kustina, 2021). Meanwhile, according to Andrian (2019), learning outcomes are patterns of behavior, values, understanding, attitudes, appreciation, and skills.

Preliminary observations from research conducted in December 2024 in class IV of SDN 05/II Air Gemuruh showed several obstacles in mathematics learning. The main problem found was unsatisfactory student learning achievement, as reflected in the daily test scores, where only 17% of students achieved the minimum competency standard in the first test, increasing slightly to 24% in the second test, and then the third test showed no improvement, remaining at the same level of 24%. This condition shows that learning outcomes have not been optimal. Students' mastery of the material is still lacking, resulting in unsatisfactory learning outcomes. One of the causes is low student participation during learning. Teacher-led learning activities are still very dominant, resulting in students being less active and not enjoying the lessons. According to Siregar, et al. (2024), students consider mathematics to be a difficult and boring subject.

To overcome this, teachers need to create a learning environment that stimulates student learning activities. One approach is to use enjoyable models and learning media so that students are more motivated and understand the material better. As stated by Sarumaha and Harefa (2023), the guided inquiry model based on big book media is a learning activity that emphasizes critical thinking in order to search for and find answers to problems on their own, where students can discover concepts from the problem-solving provided by the teacher. Meanwhile, according to Nurjanah, et al. (2022), big books are books with special characteristics, including large illustrations and text, which are designed to be attractive so that they can motivate children in learning. Although big books are generally used in Indonesian language learning, they enable students to learn to read, especially in lower grades. However, researchers are interested in modifying big books so that they can be applied in mathematics learning. The media design used is a zigzag-shaped big book. This modification aims to make it a medium for learning mathematics, specifically in the subject of data compilation. In modifying this, stronger materials are used so that it lasts longer in the learning process. The main objectives are to train courage, speaking skills, and increase student participation in class. In practice, the media is used as a modified zigzag-shaped teaching aid containing data compilation material. Students take turns filling in the answers, starting from formulating hypotheses to drawing conclusions. This media makes students more active and easier to understand the material because it is large and attractive.

This guided inquiry model based on big books has never been used in grade IV at SDN 05/II Air Gemuruh. We hope that its implementation will make learning more interesting and meaningful, while encouraging students to be active. Another goal is to improve student learning outcomes, which will ultimately improve the quality of mathematics teaching. Therefore, this study focuses on improving the process and outcomes of mathematics learning with the guided inquiry model based on big book media in that class.

2. Method

The researchers applied a classroom action research (CAR) design based on the opinion of (Arikunto, 2019). According to Arikunto (2019), this research was conducted through a series of steps, which included the planning stage, the implementation stage, the observation process during learning, and the reflection stage to assess and improve the results achieved so that the next implementation would be better. According to Azizah (2021), the purpose of PTK is to improve the quality and results of learning in a practical manner. These stages take place in a repeating cycle, as described in the classroom research design stages (1) according to Arikuno (2019), where each cycle begins again from the planning stage in order to make improvements and further development as shown in Figure 1 below.
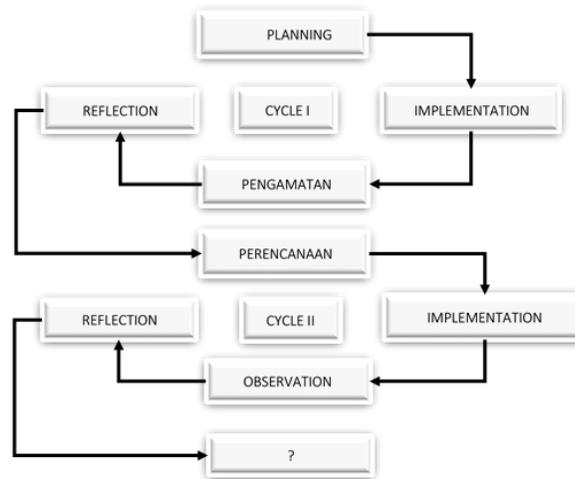
Figure 1. Guided inquiry PTK design based on big book media

The research design for this class consists of:

a. Planning Stage

In the planning or preparation stage, the steps taken by the author are as follows:
1) Reviewing the independent curriculum to understand the ATP, CP, and TP relevant to the research topic.
2) Preparing Guided Inquiry Media Based on Big Book Media
3) Preparing learning materials by applying the Big Book Media-Based Guided Inquiry Model
4) Prepare evaluation tools, such as multiple-choice questions.
5) Determining observations for the implementation of the research, which will be carried out by the homeroom teacher of class IV SDN 05/II Air Gemuruh.

b. Implementation Phase

The classroom action research was conducted based on the previously designed module guidelines. This action stage followed the learning steps listed in the module. In this process, the researcher used a guided inquiry learning model based on big books, which was adapted from the steps outlined by Isrok'atun (2019) with the following stages:
1) Preliminary Activities
   a) The teacher begins the lesson with a greeting and invites students to pray together according to their respective religions.
   b) The teacher checks student attendance.

c) The teacher conveys the learning objectives to be achieved.

d) The teacher conducts an apperception by reviewing the previous material through a question and answer session.

e) The teacher divides the students into groups of 4-5 people.

2) Core Activities

a) The teacher presents a problem through questions in the big book (Step 1).

b) Students formulate the problem (Step 2).

c) Students gather a lot of data by reading related information (Step 3).

d) Students manage data to draw conclusions (Step 4).

e) Students draw conclusions from the results of the investigation (Step 5)

3) Closing Activity

a) Teachers conduct evaluations or assessments, both for groups and individuals.

b) he teacher ends the lesson.

c) The teacher invites the students to pray together.

c. Observation Stage

According to Aikunto (2019), observation is an activity to obtain information or data by watching or observing directly the object being observed, either by using human senses such as sight, hearing, or by using certain tools. In the context of research, this observation is often referred to as the observation method, which serves to collect data relevant to the phenomenon being studied. In this study, observations were conducted by an observer or observer tasked with assessing each step of the guided inquiry model implemented by the researcher. The researcher used an observation sheet designed to document the process systematically, thoroughly, and objectively.

Observations were made thoroughly on various events during the learning process, but remained focused on the research problem. The results of the observations were then collected in the form of observation sheets. The observation stage during the implementation of the action was carried out until the research results were achieved, and this activity was carried out in several cycles. Each cycle was designed to include two learning meetings.

d. Reflection Stage

After the observation is conducted, the researcher enters the reflection stage. This stage helps to analyze, evaluate, and review the implementation of actions in the first cycle. Reflection is carried out to determine the level of success that has been achieved and the obstacles that arose during the process. The results of this reflection process will form the basis for consideration in the preparation of planning and implementation of actions in the next cycle.

This classroom action research was conducted in the even semester of the 2024/2025 academic year, specifically from February 26 to June 2025, in class IV of SDN 05/II Air Gemuruh, which had 26 students. The aim was to increase student engagement in mathematics learning by applying a guided inquiry learning model based on big book media. This research was conducted in two cycles, each consisting of two meetings. Data was collected using observation and tests. The instruments used included teacher observation sheets, student observation sheets, and learning outcome test questions. Observation was used to assess how the guided inquiry learning model based on big book media was

implemented, both from the teacher and student perspectives, while tests were used to measure the extent to which student learning outcomes improved after each cycle.

The research data was analyzed using descriptive statistical techniques. This model was used to systematically and thoroughly illustrate learning outcomes and classroom dynamics. Through this analysis, researchers were able to understand the learning process, the level of student and teacher participation, and the developments that occurred in each cycle. To support the analysis, several formulas were used to help simplify and present the data in an easy-to-understand manner. These calculations used formula (1) as adapted by Arikunto (2019), and the scores obtained by students were classified based on the provisions listed in Table 1.

$$N = \frac{Score}{aximum\ Score} \times 100\% \qquad (1)$$

Table 1. Categories for assessing the learning process

Value Range	Category
N ≤ 74%	Not Good
75%≤N≤79%	Pretty good
80%≤N≤89%	Good
90%≤N≤100%	Not Good

To determine the success rate of the learning process, formula (2) according to Septiarini, et al. (2020) was used. Then, the learning outcome data was analyzed to process the students' mathematics scores using formula (3) according to Arikunto (2019). After that, the learning outcome scores were then determined based on Table 2.

$$P = \frac{Students\ achieved\ the\ categories\ of\ fairly\ good,+good,+very\ good}{Number\ of\ students} \times 100\% \qquad (2)$$

$$P = \frac{The\ correct\ answer}{Overall\ question} \times 100\% \qquad (3)$$

Table 2. Mathematics KKTP for Grade IV of SDN 05/II Air Gemuruh

Value Range	Category
N ≤ 75	Tuntas
N <75	Tidak Tuntas

3. Results and Discussion

3.1 Results

This study comprehensively describes the implementation of a guided inquiry model based on big books in fourth grade classes at SDN 05/II Air Gemuruh. The study was conducted in two cycles, each consisting of two meetings. Cycle I was conducted on May 26 and 27, 2025, while Cycle II was conducted on May 28 and June 4, 2025. Each cycle followed the stages of planning, implementation, observation, and reflection. These stages were designed to gradually improve the quality of learning. During the learning process, the teacher's activities were observed by a teacher observer as an assessment instrument. Every action taken by the teacher had a direct impact on the students' understanding of the material. Details of the teacher performance observation results can be seen in Table 3.

Table 3. Teacher Observations

No	Cycle I	Percentage (%)	Cycle II	Percentage (%)
1	Meeting 1	90,95%	Meeting 1	100%
2	Meeting 2	100%	Meeting 2	100%

Based on Table 3, there was a 9.05% increase in teacher performance from cycle I to cycle II. During the learning process, colleagues acted as observers to monitor student engagement using observation sheets created by the researcher. Observation data regarding student activity during both cycles is shown in Figure 1 below:
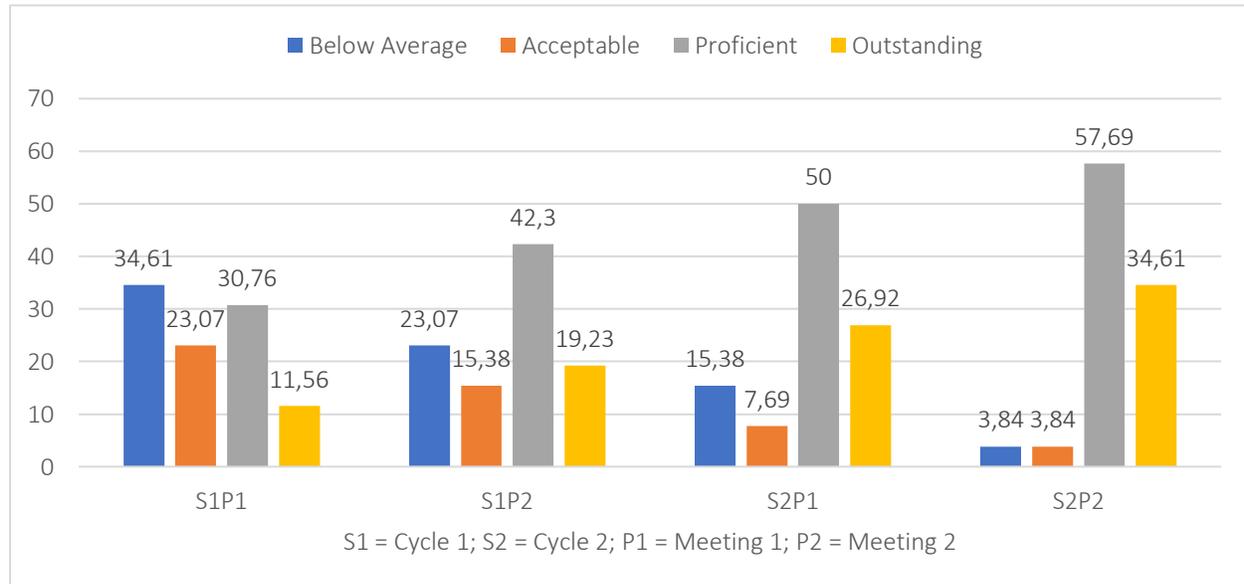

Figure 1. Recapitulation of student observation results for cycle I and cycle II

Figure 1 shows a striking increase in observations from the beginning of cycle I to the end of cycle II. Initially, there were three students categorized as "very good" in cycle I, but this number jumped to nine students (34.61%) in cycle II. The "good" category experienced a slight increase, from 30.76% to 57.69% (15 students). Meanwhile, the "fair" category dropped quite drastically from 23.61% to 3.84% (1 student). For the "poor" category, which was previously 34.61%, it decreased to 3.84% (1 student) in cycle II. Overall, there was a 23.92% increase in the "fair," "good," and "very good" categories, reflecting a positive increase in student participation during learning.

The evaluation of cycle II revealed that 24 students successfully achieved the Learning Objective Achievement Criteria (KKTP) with a score of at least 75. This achievement shows clear progress compared to the results of the initial observation. To clearly illustrate this progress, the following is a comparison between the results of the initial observation and the test scores in cycle II.

Referring to Figure 2, there was no significant increase from the initial observation to cycle II. At the beginning, only 24.13% of students achieved learning completeness. This percentage increased to 92.3% or 24 students in cycle II, resulting in an increase of 21.13%. Conversely, the number of students who did not achieve mastery decreased from 75.85% to 7.69%, a decrease of 68.16%. In cycle II, the success criteria, namely a minimum of 75% of students achieving

mastery, was met. The researchers concluded that the learning outcomes of fourth-grade students had improved as targeted. Therefore, this research was completed in cycle II and was not continued in the next cycle.

Figure 2. Classical comparison of initial observations and student test results for cycles I and II
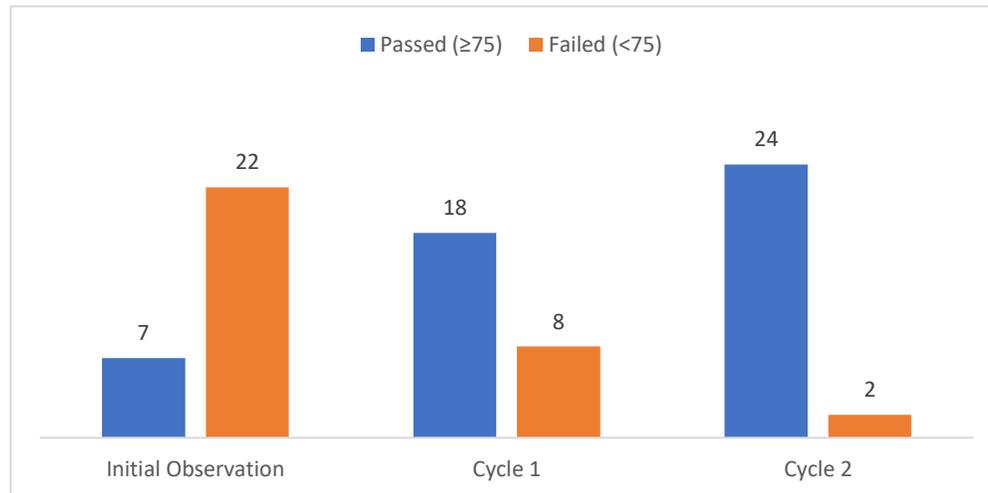
3.2 Discussion

This classroom action research was conducted in two cycles, each consisting of two meetings. The main focus of this study was the application of a guided inquiry model based on big books to increase student activity and learning outcomes. To collect data, the researcher used observation sheets to observe teacher activities and students, and administered learning outcome tests at the end of each cycle.

3.2.1 Improving the Mathematics Learning Process Using a Guided Inquiry Model Based on Big Book

The results of this study indicate that the guided inquiry model based on big book media is effective in increasing student engagement and learning achievement. Specifically, the activity process increased significantly from 69.23% in cycle I to 92.3% in cycle II. These findings are consistent with previous studies by Sujana (2020), Listiani (2018), and Shandra and Novitasari (2022), which also indicate that active learning approaches can increase student participation. This proves that direct student involvement in the learning process has a positive impact on their learning outcomes. The improvement in the students' learning process occurred because the guided inquiry model based on big book media was considered suitable for the material being taught. With this model, students were more active in group discussions, answering questions in turn by coming to the front to fill in the answers on the big book media. Student enthusiasm also increased because they learned while playing, which resulted in a 23.07% increase in activity from cycle I to cycle II.

3.2.2 Improving Mathematics Learning Outcomes Using a Guided Inquiry Model Based on Big Book

This is in line with Somayana's (2020) view that learning outcomes are academic achievements obtained from tests, assignments, and active questioning and answering, all of

which support the learning process. Learning outcomes in the initial observation were 24.13% and increased in cycle II to 92.3%, showing a significant increase of 68.17% from the initial observation to cycle II. Several previous researchers, such as Sundari and Indrayani (2019) and Magdalena (2020), also observed an increase in learning outcomes. The increase in indicators was reflected in the students' ability to respond to test questions, which showed an improvement in their understanding of the material. As explained by Yandi, et al. (2023), learning outcomes are the results achieved by students after receiving instruction within a certain period of time. Thus, this improvement shows that the guided inquiry model based on big books has succeeded in making students active and easier to absorb the material, as seen from the increasing test results.

4. Conclusions

Data analysis from this study concluded that the application of the guided inquiry model based on big books in mathematics learning in grade IV of SDN 05/II AiR Gemuruh had a positive effect on how students learned and what they achieved. There was a 9.05% improvement in teacher performance from the first cycle to the second cycle, and more significantly, student participation increased by 23.07%. In terms of learning outcomes, the percentage of students who achieved mastery increased from 69.23% in the first cycle to 92.3% in the second cycle. These results identify that the big book media-based guided inquiry model has succeeded in creating an atmosphere conducive to student learning. This research recommends the use of the big book media-based guided inquiry model in teaching. The big book media-based guided inquiry model is suitable for use in large classes, but requires adaptation and good strategy. Several challenges, such as space limitations and time management, can be overcome by using a group approach, technological assistance, and careful classroom management. If When implemented properly, this model and use of media is effective in increasing student engagement and learning outcomes, even on a larger scale.

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