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The Use of Group Investigation Learning Strategy to Improve Mathematics Learning Outcomes in Vocational High School Students

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ABSTRACT

The learning outcomes of students in class XI of SMK Negeri 1 Bengkalis are unsatisfactory because the scores are below the completion level. This is due to the lack of varied learning strategies. This research aims to improve mathematics learning outcomes by applying group investigation strategies. The formulation of the problem in this study is whether the application of group investigation strategies can improve the learning outcomes of mathematics students in class XI SMK Negeri 1 Bengkalis. This classroom action research (PTK) was conducted in 1 cycle with five meetings. The subjects of this study were students of class XI SMK Negeri 1 Bengkalis, totalling 20 people. The results showed that learning by applying a group investigation strategy on Statistics material can improve students' mathematics learning outcomes in class XI SMK Negeri 1 Bengkalis. This is evident from the percentage of student learning completeness, which reached 79.5%.

INTRODUCTION

Mathematics is very important in educating the nation's life [1]. This is because mathematics can be used in various other fields of science and support the development of technology. The importance of the role of mathematics makes the government always try to improve the quality of mathematics lessons compared to previous times.

One of the goals of learning mathematics is to improve student learning outcomes. Improving student learning outcomes is very important in learning mathematics [2]. Improving learning outcomes is one of the goals of learning mathematics at any level [3]. As an implication, enhancing learning outcomes should be owned by all children who study mathematics.

Based on student learning outcomes from test results before conducting research, mathematics learning outcomes in class XI DPIB A SMK Negeri 1 Bengkalis are still low. This can be seen from the student's grades in the last semester.

As the study from [4] mentioned, students often face difficulties learning mathematics, particularly with concepts such as volume integrals and surface areas. These difficulties and a negative perception of mathematics highlight the importance of innovative teaching strategies to enhance student understanding.

Efforts to improve students' mathematics learning outcomes continue to be made by teachers, such as group study, repeating material that is considered difficult, and providing additional practice questions. However, these efforts have not achieved the expected results. This condition shows a need to improve the quality of learning to improve learning outcomes.

Learning quality can be enhanced through the use of innovative teaching methods. For instance, collaborative learning that integrates technology, such as GeoGebra Applet, allows students to visualize mathematical objects and directly explore concepts, helping them build a stronger intuition and a deeper understanding of the material [4]. This aligns with the efforts to improve the quality of learning through innovative and engaging methods, such as the Group Investigation learning strategy used in this study.

Therefore, an effort is needed to improve student learning outcomes on the next subject matter to increase their learning outcomes. This improvement in learning outcomes was achieved by applying the Group Investigation Learning strategy in class XI DPIB A SMK Negeri 1 Bengkalis.

Learning with the Group Investigation strategy leads students to analyze the problems given to determine what is known, what is asked, and how to make the mathematical model. Furthermore, researchers provide solutions by applying the Group Investigation Learning Strategy to encourage students to learn. Through this learning strategy, students learn independently and in groups to become more active in teaching and learning.

According to [5], the Group Investigation Learning Strategy (GILS) is a group learning strategy developed to combine teaching strategies oriented towards the development of the academic study process. Learning in groups allows for more quality communication and interaction between students and students in groups, as well as between students and students between groups and between students and teachers as motivators, facilitators, and moderators. In addition, in this learning, students are placed in the same role to achieve learning objectives, mastery of subject matter, and learning success, which is seen not solely determined by the teacher but is a shared responsibility, thus encouraging the growth and development of a sense of togetherness and mutual need among students.

Collaborative learning like this, which uses the Group Investigation strategy, can also enhance students' ability to self-regulate and work together. As research by [7] emphasized, self-regulation is an important component of effective learning. Learning that prioritizes collaboration encourages students to be more involved and take responsibility for their learning process, enhancing their learning outcomes.

Previous studies have demonstrated that applying the Group Investigation learning model can significantly improve students' mathematics learning outcomes. For instance, [6] found that implementing the Group Investigation model with a differentiated learning approach effectively enhanced mathematics learning outcomes, particularly in data processing and mean material. This finding underscores the strategy's effectiveness in improving students' understanding of mathematical topics. Similarly, [7] discovered that collaborative learning through the Group Investigation model improved mathematics outcomes in elementary school students, with the experimental group that engaged in Group Investigation outperforming the control group using conventional methods. Furthermore, [8] reinforced these findings, showing that using domino mathematics media within the Group Investigation model led to better rank numbers and root forms outcomes than conventional teaching methods. These results collectively suggest that the Group Investigation strategy can potentially enhance mathematics learning outcomes across various educational contexts.

This research extends the findings of previous studies on the Group Investigation learning model, particularly in vocational education. While several studies have demonstrated the effectiveness of the Group Investigation model in improving students' mathematics learning outcomes across various educational settings, including elementary schools [6] and junior secondary schools [9] , this

study focuses on its application in a vocational high school setting, specifically in class XI at SMK Negeri 1 Bengkalis. Unlike prior studies that primarily target general high school students, this research explores how the Group Investigation model addresses the unique challenges vocational students face, particularly in subjects like statistics. Previous studies have shown that the Group Investigation model significantly improves student outcomes, including participation and academic performance in mathematics [9]. Research by [10] has demonstrated that cooperative learning models can positively influence student motivation. Building on this, applying the Group Investigation model in this study has been observed to improve student motivation and activity, cooperation, and student responsibility. This research further investigates how these improvements contribute to enhanced learning outcomes in vocational education, offering valuable insights into the broader impact of the Group Investigation learning strategy.

Based on the problems found above, the problem formulation in this study is 'Can the Application of Group Investigation Learning Strategies Improve Student Learning Outcomes in class XI DPIB A SMK Negeri 1 Bengkalis?'. This study aims to improve the learning outcomes of mathematics students in class XI DPIB A SMK Negeri 1 Bengkalis by applying the Group Investigation Learning Strategy.

METHODS

This is a classroom action research (CAR) conducted at SMK Negeri 1 Bengkalis during the odd semester of the 2022/2023 academic year. The study followed a four-stage process: planning, implementation, observation, and reflection [3]. Each stage involved specific instruments and activities, which are explained in detail below.

The first stage, planning, involved preparing the necessary learning devices. These devices comprised lesson plans (LP), student worksheets (SW), and observation sheets to monitor learning. The lesson plans outlined the learning objectives and the activities to be carried out during each session. The student worksheets were designed to guide students through tasks during group activities. Meanwhile, the observation sheets were created to record the students' participation, motivation, and engagement during the learning process. These preparations ensured that the lessons followed a structured approach to implementing the Group Investigation Learning Strategy.

The second stage, implementation, involved carrying out the learning activities outlined in the lesson plans. The Group Investigation Learning Strategy was applied in one cycle, and if the goals were not met, the cycle continued into a second cycle. The teacher delivered the lessons during this stage, facilitating student-group collaboration. Students worked on tasks provided in the worksheets, with the teacher guiding them and ensuring that each group followed the learning procedures effectively.

In the third stage, observation, the teacher and other observers monitored the students' activities during the lesson. Observation sheets were used to document the students' group participation and interactions. The teacher observed how actively the students were engaged, how they communicated within their groups, and whether they could solve the problems presented in the worksheets. This stage also involved evaluating the students' learning outcomes through the tests administered during the lessons, allowing the teacher to assess their progress.

The final stage, reflection, involved analyzing the results of the learning activities. After each cycle, the teacher reflected on the success of the learning strategy based on the observations and student test results. The teacher assessed whether the Group Investigation Learning Strategy had improved student participation, motivation, and learning outcomes. If necessary, adjustments were

made to the teaching methods or activities to enhance student engagement in the subsequent cycle.

Several instruments were employed to collect data in this study. The first instrument is the mathematics learning outcomes test, which measures students' knowledge and learning progress. A pretest was administered before applying the Group Investigation Learning Strategy to establish a baseline, followed by subsequent tests after each learning cycle to track improvement. These tests consisted of questions based on the material covered during the lessons.

In addition, student worksheets were used as an important instrument in the learning process. These worksheets guided students through group tasks during each learning session. They contained questions and problems that encouraged students to think critically and collaborate within their groups. This instrument allowed the teacher to observe students' understanding of the studied material.

Another instrument used was the observation sheets. These sheets were used to monitor and record students' participation, motivation, and cooperation during learning. The teacher and other observers filled out the observation sheets during each session, collecting qualitative data on how students interacted and engaged within their groups. This tool was essential for evaluating the extent of student involvement in the learning process and identifying areas for improvement.

Finally, lesson plans were used as a framework for the instructional activities. The lesson plans outlined the objectives and steps for each session, ensuring that the learning activities supported the Group Investigation Learning Strategy. These plans ensured that the lessons were aligned with the strategy and facilitated an active, student-centred learning environment.

The data collected from the various instruments were analyzed using descriptive and statistical methods. This analysis aimed to assess the effectiveness of the Group Investigation Learning Strategy in improving students' learning outcomes and their engagement in the learning process.

Quantitative data, primarily from the mathematics learning outcomes tests, were analyzed to track students' progress. The tests were administered before and after applying the Group Investigation Learning Strategy to measure improvements in students' understanding of the material. The analysis focused on calculating the average scores for each test and comparing these scores across different testing periods, including the pretest, test 1, test 2, and test 3. The effectiveness of the learning strategy was assessed by calculating the percentage increase in test scores for each student and the overall class average. This allowed the researcher to determine whether there was a consistent and meaningful improvement in student performance over the course of the study.

In addition to the quantitative data, qualitative data collected from the observation sheets provided valuable insights into student engagement, behaviour, and interaction during the group activities. This observational data was analyzed by identifying recurring themes and patterns in student participation across the sessions. Particular attention was given to students' motivation, level of activity, and collaboration within the groups. By comparing the observations made during different cycles of the learning strategy, changes in student behaviour and engagement could be tracked. This allowed for a deeper understanding of how the Group Investigation Learning Strategy impacted students' academic performance, approach to learning, sense of responsibility, and ability to work cooperatively with peers.

The interpretation of the data involved synthesizing the quantitative and qualitative results to form a comprehensive understanding of the impact of the Group Investigation Learning Strategy. If there were significant improvements in test scores but little change in student behaviour or participation, this would suggest that students had learned the material but had not fully engaged in

the collaborative learning process. On the other hand, a combination of improved academic performance and increased student engagement would provide strong evidence of the strategy's effectiveness. Descriptive statistics (such as average scores and percentage improvements) and content analysis of the observational data were employed to interpret the results, providing a well-rounded evaluation of the learning outcomes and overall student development.

RESULTS AND DISCUSSION

First, teachers prepare research instruments and data collection instruments. The instruments used are learning devices consisting of lesson plans (RPP), teaching materials, and student task sheets (LTS). The data collection instruments used are observation sheets and a set of mathematics learning outcomes tests consisting of learning outcomes test questions and answer keys.

Second, the teacher determines class VIIB SMP Negeri 10 Bengkalis as the action class. Before the application of the Group Investigation Learning Strategy begins, the teacher forms heterogeneous cooperative groups of students, each of which consists of students with different academic abilities and genders.

Third, the teacher gave an initial test (pretest) to students. The scores obtained by students after taking the initial test were then sorted from the highest to the lowest.

Fourth, the teacher explained to the students the steps in applying the Group Investigation Learning Strategy in front of the class and determined the position of the groups after the cooperative groups were divided by the teacher.

Class Presentation

The application of group investigation learning strategies to improve mathematics learning outcomes on Statistics was conducted in five meetings with five learning scenarios.

1. First Meeting (Thursday, October 27 2023)

Before the Group Investigation Learning Strategy (GILS) began, students were already in cooperative groups that had been previously formed. Learning activities began by conveying learning objectives and motivating students to learn by taking examples of the application of material from real life. The teacher also reminded the students of the steps in learning using group investigation. Furthermore, the teacher gave Teaching material-1 and Student Worksheet (SW)-1 to students in each group.

During the learning process, the teacher observes students' activities in the group. At this first meeting, the atmosphere of group discussion looks stiff. Only two groups are actively involved in the discussion, while others are absorbed in reading and studying teaching materials individually. The teacher tries to encourage discussion activities to occur, especially in groups that look inactive. However, it was different when students were working on SW-1. The atmosphere was a little noisy. Causing group activities to look so active. Groups that did not understand began to dare to ask group mates, other groups, and the teacher. This first meeting was closed with presentations from several groups, and the teacher made some conclusions based on what students had done on SW-1.

2. Second Meeting (Thursday, November 02 2023)

As in the previous meeting, students were in their groups before the learning began. Learning activities began by conveying learning objectives and motivating students by providing examples of applying learning from real life. The teacher said that the material to be learned today continues the previous material, where statistics discussed and found in previous knowledge will be used to answer

problems seen in everyday life. Furthermore, the teacher provides teaching materials-2 and SW-2 to students in each group.

During the learning process, the teacher observed students' activities and the improvement of mathematics learning outcomes with the application of group investigation learning strategies by students. At this meeting, students seemed happy to study Teaching materials-2 by discussing the material contained in the teaching materials with group members. Groups that did not understand the material in teaching material-2 were not ashamed to ask the teacher. However, the two groups were still embarrassed to ask, even though the teacher saw that the two groups did not understand the material. The teacher took the initiative to discuss the material that was not understood by the two groups together and motivated them not to be shy to ask if they found difficulties in learning the teaching materials.

At the time of working on SW-2, students looked excited. Student enthusiasm can be seen from group cooperation in working on each step in SW-2. However, there were some weaknesses at this meeting, such as sentences that students on SW-2 did not understand, so the teacher had to explain the sentence's meaning to each group.

From the observation sheet filled in by the observer teacher, it was suggested that the teacher explain the general description of the SW first. This suggestion is useful so that the same thing does not repeat itself at the next meeting. This meeting ended with a presentation by one group chosen by the teacher and then a discussion of the results of the work on SW-2. Then, the teacher and students concluded from the material learned in the teaching materials and SW-2 and conducted the first test.

3. Third Meeting (Thursday, November 09 2023)

Before starting the learning activities, students were already in their respective groups. Learning activities began by conveying learning objectives and motivating students by giving examples of learning applications from real life. All students seemed enthusiastic about listening to the teacher's explanation. From the observation, students seemed to be getting used to applying the group investigation learning strategy, so the learning process went smoothly. Each group actively discussed the teaching materials together. Some groups who did not understand the material were not shy about asking the teacher and discussing it together. The teacher acted as a facilitator by sitting with the groups and trying to create a warm discussion in the groups. The active discussion in the groups and the number of groups asking questions to the teacher made the class atmosphere a little noisy and invited other class students to observe the class.

Thus, when working on SW-3, students seemed eager to solve the problems in groups. When viewed from the steps in working on SW-3, the difficulty students face is understanding the problem's form.

This meeting ended with discussing the results obtained in SW-3, and all groups worked on SW-3 correctly. Then, the teacher appreciated the students' cooperation at the meeting and made conclusions about the material learned.

4. Fourth Meeting (Thursday, November 16 2023)

The fourth meeting was conducted after students took the second Learning Outcome Test, which was held on Thursday, November 09, 2023. The first test results and group progress scores were announced on Thursday, November 16, 2023. Almost all students were satisfied with the results achieved in this first test. Students were already in their predetermined cooperative groups before the

learning activity. The teacher observed that students' learning motivation had increased, as seen from the students' responses when the teacher entered the classroom. The fourth meeting began with the teacher conveying the learning objectives and providing learning motivation to the students. However, at this meeting, some students were seen not listening to the explanation from the teacher and were busy telling stories. This condition disturbed other students, and the teacher warned them to tell group stories.

The class atmosphere when the group worked on SW-4 looked better than before. The prompts in SW-4 and the problems given made students work actively. Some students who did not understand were not shy to ask their group mates, and others were willing to help explain. The SW-4 activity made the class quiet because students were busy working on SW-4. The problems were solved together, and there was an active discussion among the groups.

As usual, the learning activity ended with a presentation from 1 group, continued with a class discussion, and closed by making conclusions from the material learned from the meeting.

5. Fifth Meeting (Thursday, November 23 2023)

At this meeting, the teacher brings learning tools in objects that resemble the form of Statistics (shoe size, shirt size, number of passengers riding the bus) and others. As usual, the teacher starts the learning by conveying learning objectives and providing learning motivation. Students look enthusiastic by paying attention to the explanation given by the teacher. Then, the teacher distributed teaching materials five and SW-5 to each group leader to share with other group members.

When studying teaching material 5, students did not seem to understand the material. This lack of understanding was observed by all groups, who took turns asking the teacher for clarification. Then, the teacher took the initiative to explain in detail from teaching material five before students worked on SW-5, hoping that when working on SW-5, students did not look confused. The explanation was very helpful for students' understanding because when working on SW-5, it was seen that each group member and each group competed to get the most appropriate solution to the problem given, namely finding the shortest path.

The meeting ended with a joint discussion and conclusion. Before leaving the class, the teacher reminded the students that the next meeting would be the third test, motivating them to prepare better. The third test was conducted on Thursday, November 30, 2023.

Reflection/Analysis of Action Results

The action results analyzed were the activities of teachers and students before the learning process, the value of student development, and student learning completeness individually and in groups for each competency standard, basic competency, and the success of the action.

To determine the suitability of the implementation of actions with learning Improving Mathematics learning outcomes with the Application of Group Investigation Learning Strategies (GILS) from teacher and student activities during the learning process, it can be seen that the activities carried out by teachers and students during the learning process have been carried out as planned. The students' activeness in group discussions has developed at every meeting. Groups that look silent and rigid at the beginning of the meeting become more active in the last meetings, even tend to cause hubbub and commotion. The desire to solve the problems given independently and in groups also increased meeting by meeting. Students who are shy to ask questions and perform in front of the class no longer occur as in the early meetings. This all shows that student learning activities in the

class have increased.

We can see the improvement in students' learning outcomes in class XI DPIB A SMK Negeri 1 Bengkalis in cycle 1 in Table 1 below.

Table 1. Learning Outcome Score

No	Meetings	Value in Percent		
		Test 1	Test 2	Test 3
1	First	71	71	78
2	Second	79	79	82
3	Third	74	75	82
4	Fourth	64	68	77
Average		72,25%	73,5%	79,5%

From Table 1, we can conclude that the test results continue to improve each time the test is held. This improvement can be seen in the first test, where the average percentage value was 72.25%. In the second test, the average increased to 73.5%; in the third test, the average further increased to 79.5%.

Four objects of observation are evaluated in each cycle: Motivation, Activity, Cooperation, and Responsibility.

Table 2. Object of Observation

No	Object of Observation	Value in Percent		
		Test 1	Test 2	Test 3
1	Motivation	76	78	70
2	Activity	72	73	75
3	Cooperation	75	75	75
4	Responsibility	69,4	69,4	80
Average		73%	73,75%	74,75%

Table 2 shows that students' motivation, activity, cooperation, and responsibility in the three tests have increased, although the increase is not too significant. This improvement can be observed in the results of Test 1, where the score was 73%, which increased to 73.75% in Test 2 and 74.4% in Test 3.

From the table, the recapitulation of student learning completeness from the first to the third test continues to increase, whereas on the first test, students scored 72.25%. The second test had a score of 73.5%, the third test had a score of 79.5%. In this third test, the increase in value increased by 6 points. Compared to the second test, the increase in value was only 1 point.

Based on data from student learning outcomes and process evaluation results, it can be concluded that applying the Group Investigation Learning Strategy improves students' mathematics problem-solving abilities in class XI DPIB A at SMK Negeri 1 Bengkalis significantly. This conclusion is supported by several studies that have demonstrated the effectiveness of the Group Investigation model in enhancing student engagement and problem-solving skills.

The application of the Group Investigation strategy has been shown to foster student responsibility, enhance their understanding of the material, and boost their confidence in participating actively in class. Studies by [11] found that the Group Investigation model is more effective than other models, such as Problem-Based Learning (PBL), in improving students' conceptual

understanding and problem-solving abilities. In this study, students exhibited increased courage and confidence in presenting their findings, consistent with the literature on the Group Investigation model's ability to encourage student participation and collaboration.

Students were highly engaged and motivated throughout the learning process, showing enthusiasm in completing group assignments. These observations align with the findings of [12], who documented similar improvements in student engagement and communication skills when the Group Investigation model was applied. These results highlight the Group Investigation model's positive influence on fostering active participation and collaboration in problem-solving activities.

Regarding the test results, there was a notable improvement in students' scores throughout the three cycles. In the first test, 12 students scored 75, 5 scored 70, and 3 scored 65. In the second test, four students scored 80, 7 scored 75, and 8 scored 70. By the third test, the scores showed substantial improvement, with five students achieving a score of 85, 8 students scoring 80, and 7 students scoring 75. This progress mirrors findings from [13], who reported similar improvements in mathematical problem-solving abilities through collaborative learning models.

This improvement in learning outcomes is also reflected in the increased motivation, activeness, and cooperation observed in the learning process. The average observation score for this cycle was 73.8%, indicating a positive trend in student engagement. The results from this study align with previous research by [13], who highlighted the significant impact of collaborative learning models, including Group Investigation, on improving students' academic outcomes and engagement.

The findings from this research have significant implications for using the Group Investigation Learning Strategy in improving mathematics learning outcomes, particularly in vocational education. This study demonstrates that applying the Group Investigation strategy enhances student engagement, problem-solving abilities, and overall learning outcomes in mathematics to a significant degree. These results align with previous research, such as using Group Investigation in vocational and other educational settings [14], [15]. The study shows that this strategy promotes collaboration, student responsibility, and critical thinking skills, which are crucial for academic success.

The observed improvements in student performance over the three testing cycles, including increasing scores and growing student involvement in group discussions and problem-solving activities, reflect the study's impact. This result reinforces the value of cooperative learning models like Group Investigation in fostering active participation and deeper understanding among students [16], [17].

Moreover, this research highlights the practical implications for educators, suggesting that adopting the Group Investigation strategy can lead to more dynamic and student-centered learning environments. Students engage more actively with the content in these environments, collaborate effectively, and develop critical thinking skills. This approach aligns with the goals of fostering mathematical literacy and problem-solving abilities in students [18].

However, several limitations should be acknowledged when interpreting the results of this study. First, the research was conducted in a specific context—Class XI DPIB A students at SMK Negeri 1 Bengkalis. As such, the findings may not be fully generalizable to other educational settings or student populations. The sample size of 20 students may not represent a broad spectrum of student abilities, and the study's scope is limited to one classroom, which constrains the ability to apply the results to a wider range of contexts.

Additionally, the study was carried out over a relatively short period (three cycles), which limits the ability to assess the long-term effects of the Group Investigation strategy on student learning

outcomes. Future research could examine the sustainability of these improvements over a more extended period and in other types of educational institutions.

Another limitation is the reliance on test scores and observational data as the primary means of measuring student progress. While these assessments provide valuable insights into student performance, they may not fully capture all dimensions of student development, such as the deeper conceptual understanding or non-cognitive skills like creativity and motivation. Future studies could incorporate more diverse assessment methods, such as project-based assessments or qualitative interviews, to provide a more comprehensive evaluation of student growth and the long-term impact of the Group Investigation strategy.

CONCLUSSION AND SUGGESTIONS

The mathematics learning outcomes of students in class XI DPIB A at SMK Negeri 1 Bengkalis are significantly improved by applying the Group Investigation Learning Strategy. The research findings show that this strategy fosters better student engagement, motivation, and cooperation, leading to higher learning achievements, as reflected in the increased test scores throughout the cycles. The students' problem-solving abilities and critical thinking skills were also enhanced, highlighting the effectiveness of the Group Investigation approach in a vocational education setting.

However, this research has several limitations. First, the study was conducted in a specific class of 20 students, which limits the generalizability of the findings to other contexts or larger populations. Additionally, the research was carried out over a relatively short period of three cycles, which does not allow for an assessment of the long-term effects of the Group Investigation strategy on student learning outcomes. Further research could explore the sustainability of these improvements over an extended period and in different educational settings.

Moreover, the study primarily relied on test scores and observational data to assess student progress, which may not capture all aspects of student development, such as their deeper conceptual understanding or non-cognitive skills like creativity. Future studies should consider incorporating alternative assessment methods, such as project-based assessments. They should also consider using qualitative interviews to provide a more comprehensive evaluation of student growth and the long-term impact of the Group Investigation strategy. Based on these findings, it is recommended that educators continue to adopt the Group Investigation Learning Strategy to improve student learning outcomes, particularly in vocational education. Additionally, future research should consider broadening the scope of the study to include different student groups and educational contexts and explore the long-term impact of this strategy.

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BIOGRAPHY

Wenny Susanti

Wenny Susanti, commonly known as Wenny, was born in Bengkalis on October 14, 1986. She is the second child of four siblings and the daughter of Supriadi and Norida. She resides on Jalan Awang Mahmuda, Desa Kuala Alam, Bengkalis District, Bengkalis Regency. She is an Indonesian citizen and a Muslim. The author began her education at SD Negeri 030 Bengkalis, where she studied for six years, before continuing her education at SLTP Negeri 03 Bengkalis for three years. She then attended SMA Negeri 02 Bengkalis, graduating in 2004. The same year, she pursued higher education at Politeknik Bengkalis, majoring in Civil Engineering (D3). She completed her studies in three years, producing a final project titled "Planning of Clean Water Network in Sungai Alam Village". In 2008, she continued her studies at Sekolah Tinggi Keguruan dan Ilmu Pendidikan Pelita Bangsa (STKIP) Medan, enrolling in the Mathematics Education program. She completed her studies in four years, graduating in 2013. Subsequently, she continued her postgraduate studies at the University Riau, Pekanbaru, in the Faculty of Mathematics and Natural Sciences.