

Implementation of Guided Inquiry Model with MURDER Strategy to Improve Elementary School Students' Science Process Skills

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Abstract

Science learning is an educational activity that emphasizes the development of students' abilities and skills in learning. One crucial skill that students need to master in the learning process is science process skills. Science process skills enable students to independently discover concepts from various learning sources through exercises conducted during the learning process. This study aims to determine the effectiveness of the guided inquiry model with the MURDER strategy in improving students' scientific process skills. The method used in this study was quasi-experimental. The sample consisted of fifth-grade students from SDN 262 Panyileukan, Bandung City with 50 students in the experimental group and 50 students in the control group. The research results showed that the average post-test score obtained by the experimental group was 84.45, which was higher compared to the control group's score of 72.71. Additionally, the n-gain test results for the experimental group yielded a score of 0.58, while the control group had a score of 0.31. In conclusion, the guided inquiry model with the MURDER strategy was effective in improving students' science process skills.

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INTRODUCTION

Learning is the process of interaction between teachers and students, involving all aspects within it, to achieve predetermined goals. The teaching and learning activities are comprehensive interactions between students who are learning and teachers who are teaching, resulting in a reciprocal relationship (Maretasari & Subali, 2012). In the learning process, it is not only about the transfer of knowledge from teachers to students, but teachers must also be able to instill good attitudes and morals in students, as well as develop students' skills according to the expected competencies. Learning is a unified system of interconnected components that interact to achieve specific outcomes and predetermined objectives (Hanafy, 2014). Furthermore, learning is also defined as the process of providing guidance and assistance to students in their learning process (Pane & Dasopang, 2017).

Learning must be planned in such a way that the set objectives can be achieved. In the learning process, the teacher plays a crucial role. A teacher must have the ability to design lessons that are deemed suitable for students' interests, talents, and developmental levels, including utilizing various resources and learning media to ensure the effectiveness of the learning process. If a teacher possesses the spirit of dedication by carrying out their professionalism, they will succeed in providing what the students need: attitudes, knowledge, and skills to shape their personalities for their future life (Hermawan, 2014).

The current learning process should be centered around the students. In other words, learning must provide space for students to develop the necessary abilities and skills. One of the subjects in elementary school that can offer more extensive room for students to develop their knowledge and skills is Science (IPA). It is well known that Science is a subject that explores the events occurring in the surrounding environment. The purpose of Science education is to provide students with the opportunity to acquire positive abilities and skills related to the

natural world by being aware of various occurrences and the beauty of nature (Widiyono, 2021).

Science education encompasses material containing knowledge that is close to and embedded in students' lives. The purpose of science education is not only for students to comprehend the content and concepts but also to instill a passion for learning and the skills to solve the problems they are studying. In science education, to instill a concept during the learning process, teachers must teach the material in a real-life context by relating it to the surrounding environment (Lilis & Kelana, 2021).

One of the objectives of Science (IPA) education is to understand the world as it is through a series of scientific processes. Science is one of the fields of knowledge that can help explain what exists in the world around us (Sholihah, 2019). To achieve the learning objectives, effective science education is student-centered, where students take an active role in the learning process. Science education aims to instill curiosity and a positive attitude toward science, society, and technology in students. It also aims to develop students' skills in investigation, problem-solving, and decision-making, as well as to cultivate scientific concepts that can be applied in everyday life (Surahman et al., 2015).

Science education is not merely a collection of facts, it goes beyond that. Science involves several aspects, such as observing phenomena, classifying them, predicting possibilities, conducting experiments, and drawing conclusions from the test results Sujana et al., (2014). In line with the aforementioned viewpoint, the teaching and learning process of science places a greater emphasis on the approach of process skills, enabling students to discover facts, construct concepts, theories, and cultivate a scientific attitude (Iswatun et al., 2017). Based on this explanation, the purpose of science education is not solely to impart concepts to students, but also to enable them to directly experience what they are learning through various activities. Moreover, it is

expected that students' skills in learning science will improve significantly.

One of the ways to ensure that science education is carried out optimally is by implementing a specific model or approach, considering the students' characteristics. Science education should be student-centered, where students take an active role in the learning process. It is expected that science education becomes a platform for students to explore their surroundings and apply their knowledge to everyday life (Tias, 2017). In the learning process, teachers play a crucial role. A teacher must possess the ability to design lessons that align with students' interests, talents, and developmental levels, which includes utilizing various resources and instructional media to ensure the effectiveness of learning. According to Lusidawaty et al., (2020), in science education, the role of the teacher is that of a director and guide, while the active participant is the student themselves. Therefore, the teacher's role in the learning process should be that of a facilitator. Being a facilitator means that the teacher provides support and assistance to ease students' engagement in the learning process, allowing them to develop their abilities and skills during the learning activities

The essential skills that students need to master in science education are the science process skills. These skills form the core of science learning and serve as the foundation for developing understanding and knowledge of scientific ideas and concepts (Sideri & Skoumios, 2021). Science process skills encompass a range of abilities that focus on developing students' capacity to process knowledge, discover, and develop facts during the learning process. According to Wardani (2011), process skills are an instructional approach that focuses on developing students' mental, physical, and social abilities as the foundation for driving higher-order capabilities within individuals. Therefore, mastering science process skills is crucial for students because by doing so, they gain a deeper understanding of what they are learning during the learning

process, and most importantly, they can apply this knowledge in their daily lives.

Students must master science process skills because they enable them to independently discover concepts from various learning sources through the exercises they undertake during the learning process. Additionally, science process skills can assist students in understanding concepts and solving problems they encounter in their studies. Developing science process skills is of utmost importance in the learning process because possessing these skills allows students to have a deeper understanding of what they are studying. With science process skills, students don't merely acquire knowledge passively instead, they actively discover knowledge themselves (Juraini et al., 2017). According to Kurniawan et al., (2019), science process skills are considered to provide meaningful learning experiences for students as they aid in developing higher-order and critical thinking skills.

The hierarchical structure of science process skills consists of two parts, basic skills and integrated skills. Basic skills include observation, classification, prediction, data recording, spatial and temporal relationships. On the other hand, integrated skills encompass data interpretation, controlling variables, defining and formulating hypotheses (Wardani, 2011). Additionally, the indicator of science process skills as cited by Robiatul et al., (2020) based on Rustaman that is observing, classifying, interpreting, predicting, questioning, hypothesizing, designing experiments, using tools and materials, applying concepts, and communicating.

One of the suitable models to be applied in science education, which can enhance students' scientific process skills, is the guided inquiry model. Guided inquiry is a learning model that requires students to actively engage in the learning process by investigating and constructing their own knowledge, with guidance from the teacher (Khasanah et al., 2018).

This is in line with the opinion of Supriadi et al., (2019), which states that guided

inquiry is a learning model that creates a learning situation involving students actively and independently constructing concepts or theories, understanding, and solving problems, additionally according to Aryani et al., (2019), guided inquiry is a model for acquiring knowledge that students should undertake through questioning, observation, investigation, analysis, and evaluation.

Inquiry-based learning is a learning process in which students are encouraged to develop knowledge and skills through engaging in activities aimed at solving problems, initiated by the students themselves (Gittens & Calandrino, 2015). Inquiry is a sequence of learning activities that fully involve students' capabilities to seek and systematically, critically, and logically investigate, enabling them to independently discover knowledge, attitudes, and skills, resulting in behavioral changes. Inquiry-based learning is an educational activity that maximizes students' capabilities to seek and investigate something (objects, humans, or events) systematically, critically, logically, and analytically, allowing them to formulate their findings with confidence. Within the guided inquiry learning process, students observe, investigate, and develop an understanding of natural phenomena by directly experiencing those phenomena (García-Carmona et al., 2017).

The selection of the guided inquiry model is due to the teacher's role in determining the problems and the steps to solve them, while students work together in group discussions to find solutions and draw independent conclusions. Therefore, guided inquiry can be defined as one of the inquiry-based or discovery learning models in which problems and their solutions are presented by the teacher. In the guided inquiry approach, students are engaged in the decision-making process from the beginning of the learning activity until they solve the problem (Zion et al., 2020). Based on the explanation above, it can be concluded that inquiry is a learning approach that involves students in discovering knowledge or understanding through investigation, starting

from making observations, asking questions, planning investigations, collecting data or information, conducting inquiries, analyzing data, drawing conclusions, and communicating the investigation's results.

Guided inquiry learning positions students as active participants and subjects of their own learning. They play a vital role in discovering the essence of the subject matter on their own. The teacher, on the other hand, acts as a guide, facilitating change, and serving as a motivator and facilitator for the students. Furthermore, guided inquiry learning offers opportunities for students to collaborate in group activities, fostering teamwork and cooperation. Working in groups allows students to develop their argumentation skills and collaboratively solve problems with their peers (Amijaya et al., 2018).

The guided inquiry model is chosen because elementary school students are not yet accustomed to being left without teacher control during learning activities. They still need guidance and direction when solving problems and may lose their way during the learning process (Sulistiyono, 2020). Through guided inquiry learning, the teacher provides guidance and directions to students, enabling them to engage in investigative activities. This approach demands a high level of student involvement in the learning process. The guided inquiry model originates from the constructivism theory. Therefore, it is characterized by active student participation in learning activities, such as observing, questioning, investigating, analyzing, and communicating results (Kang & Keinonen, 2018). Guided inquiry is a collaborative learning approach that provides students with authentic learning experiences, aiding them in better understanding the subject matter (Kartono & Shora, 2020).

The implementation of guided inquiry in the classroom will be more effective if the necessary steps are taken into consideration during the learning process. Here is an explanation of the steps of the guided inquiry model according to Jabar (2018). The first step is to formulate the problem, during this stage,

students are presented with a problem prepared by the teacher. Students are engaged in the problem, and it is presented in a way that challenges them to think critically and solve the problem. The second step is to formulate hypotheses. Hypotheses are temporary answers to the problem being investigated. At this stage, students are asked to provide tentative answers before knowing the definite answer. These hypotheses are then subject to testing to determine their accuracy.

The third step is data collection. At this stage, students are given the opportunity to seek and gather data or information that can be used to test the hypotheses they have formulated. This activity trains students to be careful in data collection to ensure accuracy. It also familiarizes them with seeking and formulating various problem-solving alternatives through various activities, such as asking questions to their peers, engaging in discussions, and seeking learning resources. The fourth step is testing the hypotheses. At this stage, students analyze the data to draw conclusions. The results of testing the hypotheses are then communicated to other students or presented to share information and facilitate communication.

The fifth step is drawing conclusions. During this activity, students are directed to draw conclusions, where they explain the findings they obtained based on testing the hypotheses. Based on these steps, guided inquiry learning has the potential to be beneficial in enhancing students' science process skills. The guided inquiry model is implemented in collaborative group settings, where students engage in a series of activities and structured questions for discussion and answering (Rands et al., 2021). According to Palupi et al., (2020), in guided inquiry learning, students encounter various concepts of the subject matter and are required to think and develop hypotheses like scientists. These hypotheses then need to be supported with evidence, data, and information.

Apart from implementing a learning model that can develop and enhance scientific process skills, the use of learning strategies is essential to ensure a more effective and efficient

learning process. Learning strategies are activities or methods employed by teachers and students to achieve learning objectives effectively and efficiently. The positive impact of learning strategies is that they make the learning process more engaging for students, thus creating a positive learning atmosphere (Endres et al., 2021). One suitable learning strategy to support the implementation of the guided inquiry model is the MURDER strategy. The MURDER strategy is a learning strategy that consists of the following stages Mood, Understand, Recall, Digest, Expand, and Review.

The stage of MURDER strategy according to Ardina & Baskara (2015). The Mood stage, learning is best conducted with a positive mood, which should be fostered by both teachers and students. A good mood in the classroom sets a foundation for meaningful and enjoyable learning. Therefore, efforts should be made to ensure that the learning process is enjoyable. First, by arranging a neat and appealing classroom environment, which includes addressing health aspects. Second, by implementing lively and varied teaching approaches, such as using diverse instructional patterns, models, relevant learning media, and resources.

The Understand Stage, understanding is a dynamic process, and it is expected to be creative. Students will generate imagination and peaceful thoughts. However, when the learners truly comprehend the materials presented by their teachers, they will be ready to provide definitive answers to questions or various learning challenges.

The Recall Stage, recalling is an active effort to encode information into long-term memory. This can be done by "remembering" facts through visual, auditory, or physical means. The brain has multiple memory devices, and the more devices (senses) involved, the better a new piece of information is retained. Recall aims to provide students with an opportunity to organize or reconstruct the information they have received.

The Digest Stage, the success of a teaching process is measured by how well

students can master the delivered subject matter by the teacher. The content or subject matter is the second component in the learning system. In certain contexts, the subject matter is considered the core of the learning process. This means that the learning process is often interpreted as the process of delivering the material. This can be justified when the primary goal of learning is the mastery of the subject matter.

The Expand Stage, expansion is the cumulative outcome of the learning process. The result of the learning process is a change in students' behavior. Individuals will acquire new, lasting, functional, positive, and well-founded behaviors. The change in behavior as a learning outcome encompasses cognitive, affective, and psychomotor aspects.

The Review Stage, it involves revisiting the material after completing a chapter or topic, going back and rereading what was learned while checking their notes. The main points are skimmed briefly to gain a clearer understanding of the integrated concepts presented together.

In the MURDER strategy, the learning activities are not monotonously centered around the teacher, as it involves active student engagement throughout the learning process. Through student discussions, interactions, and sharing of ideas and opinions, they can better understand the concepts being taught. The MURDER strategy fosters a learning environment where students are motivated to learn independently and actively engage in the material through discussions (Thahir et al., 2019).

The MURDER strategy provides students with the opportunity to ask about things they do not understand and allows them to explain what they have understood to their classmates. The stages in this strategy also play a role in increasing student participation in the learning process and facilitating their understanding of the subject matter. (Ardina & Baskara, 2015). The stages in this strategy create a more organized and focused learning time for students during the learning activities.

The application of the guided inquiry learning model with the MURDER strategy in

this research is intended to help students better understand the learning materials and develop their science process skills in science learning through the stages of the guided inquiry learning model and the MURDER strategy itself. This is because scientific process skills play a crucial role in driving students' scientific inquiry activities (Ping et al., 2020). The following are the results of previous research on the guided inquiry learning model and the MURDER strategy.

The research conducted by Nopiya et al., (2020), found that the guided inquiry model can enhance students' science process skills, as evidenced by the results with a percentage of 93% in the excellent category. Another study by Rands et al., (2021), demonstrated that the guided inquiry model can improve students' understanding in learning, as indicated by the students' median score of 79% achieved through the use of the guided inquiry model. Another research conducted by Iswatun et al., (2017), showed that the guided inquiry model can improve and have a positive impact on students' scientific process skills and learning outcomes. The guided inquiry model was found to have an influence of 30.69%. These results indicate that implementing the guided inquiry model in the learning process can lead to significant improvements in students' scientific process skills and overall learning outcomes.

The explanation above presents some of the results from research by implementing the guided inquiry model, which was also assisted by the application of the MURDER learning strategy. Below are some of the results from research using the MURDER strategy. The research conducted by Mukhlas & Sholihah (2021), in the research results, the MURDER strategy was found to improve students' learning outcomes, with an average score of 76.83 in the experimental class compared to 73.63 in the control class. Another study conducted by Sofiah (2020), showed that the MURDER strategy can enhance students' understanding in learning. This improvement was evident from the test of the difference in average scores, which indicated that students who learned using the

MURDER strategy had a better understanding compared to those in the conventional learning class.

The purpose of this research is to determine the effectiveness of implementing the guided inquiry model with the MURDER strategy on students' scientific process skills and to understand the profile of students' scientific process skills in the fifth-grade students of SDN 262 Panyileukan, Panyileukan District, Bandung City. The theoretical benefits of this research lie in the application of the guided inquiry model with the MURDER strategy, which aligns with the constructivist theory. This model and strategy emphasize active student participation in the learning process, which is in line with the constructivist principles. On the other hand, the practical benefits of this research are that the applied model and strategy can serve as a reference for developing engaging learning models for students and as a valuable resource for developing teaching methods in schools. Furthermore, it can also help train teachers in designing innovative and creative teaching models.

METHODS

The method employed in this research is quasi-experiment. The population consisted of fifth-grade students from elementary schools in the Panyileukan sub-district, Bandung City. The sample of the study included 25 students from Class V-A and 25 students from Class V-B of SDN 262 Panyileukan as the experimental group, and 25 students from Class V-C and 25 students from Class V-D of SDN 262 Panyileukan as the control group, with a total sample size of 100 students. Data collection was conducted used the technique of a science process skills test. Data analysis involved the used of an independent t-test and N-gain to determine the effectiveness of the guided inquiry model with the MURDER strategy in enhancing students' science process skills. The research design is presented in Table 1.

Table 1 Research Design

Class	Pretest	Treatment	Post test
Experiment	O ₁	X	O ₂
Control	O ₃	-	O ₄

Information:

- O₁ = Pretest experimental group
- O₃ = Pretest control group
- O₂ = Posttest experimental group
- O₄ = Posttest control group
- X = Guided Inquiry Model with MURDER Strategy

RESULTS AND DISCUSSION

The analysis of data from the pretest and posttest results is used to determine the effectiveness of implementing the guided inquiry model with the MURDER strategy on students' science process skills in both the experimental and control groups. The data analysis includes calculating the minimum, maximum, and mean values obtained by students before and after the treatment. Additionally, tests for normality, differences in means, and N-gain are conducted. The data analysis can be observed in the following Tables 1 and 2.

Table 1 Experimental Group Statistical Test Result

Statistical Test	Pretest	Posttest
Minimum score	33	53
Maximum score	87	100
Average	62.15	84.45
Mean difference test	0.000	
N-Gain test	0.58	

Table 2 Control Group Statistical Test Result

Statistical Test	Pretest	Posttest
Minimum score	20	50
Maximum score	86	86
Average	59.95	72.71
Mean difference test	0.000	
N-Gain test	0.31	

Based on the results obtained, the average science process skills score for the experimental group before the treatment, as indicated by the pretest, was 62.15. For the control group, the average SPS score before the treatment was 59.95. In order to improve the students' science process skills, the experimental group received the treatment by implementing the guided inquiry model assisted with the MURDER learning strategy, while the control group only received the treatment by implementing the guided inquiry model.

There was an improvement in the posttest scores in both classes. This increase in scores is attributed to the implementation of the guided inquiry model with the MURDER strategy. The guided inquiry model is a learning approach that encourages active student participation in acquiring knowledge (Seranica et al., 2018). Based on the posttest results, the average science process skills score for the experimental group was 84.45, while the control group obtained an average score of 72.71. These scores showed an increase compared to the scores before the students were exposed to the guided inquiry model with the MURDER strategy.

The improvement in the scores is due to the effective implementation of the guided inquiry model with the MURDER strategy, where each phase was carried out successfully. Additionally, attention was given to the indicators of science process skills (SPS) to ensure alignment. The MURDER strategy was chosen because its phases complement those of the guided inquiry model. According to Hariri et al. (2020), selecting an appropriate learning strategy can enhance students' motivation to learn. The first stage in the guided inquiry model is to formulate the problem. The implementation of this stage is to assist students in honing the skills of the science process skills (SPS) indicators, namely observing and classifying. The problem formulation stage is combined with the initial stage of the MURDER strategy, which is "Mood." Its application involves conditioning students to be ready to learn with a happy and joyful mood. Once the students are conditioned to be in a cheerful and prepared

mood for learning, the subsequent stages of the guided inquiry model and the MURDER strategy are carried out until the final stage.

Based on the results, the N-gain test for the experimental class yielded a score of 0.58, categorized as moderate, while the control class obtained a score of 0.31, also categorized as moderate. The average gain scores show a considerable difference between the experimental and control classes. This finding demonstrates that the implementation of the guided inquiry model with the MURDER strategy is more effective than using the guided inquiry model alone. Guided inquiry learning, according to Howley (2020), strongly supports students in constructing a conceptual understanding of the subject matter through active collaboration within their groups. Additionally, learning with the MURDER strategy aims to promote students' independence in learning, while allowing teachers to monitor their learning methods (Nasution et al., 2021).

No obstacles were found that hindered the achievement of the learning objectives during the implementation of the learning activities. All stages of the guided inquiry model and the MURDER strategy were well followed by the students. The limitations found in the learning activities were related to the science process skills (SPS) indicator of communication, where some students lacked confidence in communicating their learning outcomes with their group. However, no other issues were encountered with the other SPS indicators. In the guided inquiry model, the teacher plays a role in providing examples and specific learning topics, which can encourage student engagement and motivation in learning (Cahaya et al., 2023).

In addition to obtaining the results of the students' science process skills scores, the results of the test items acquired by the students in the experimental and control groups were analyzed based on the aspects of science process skills (SPS). The calculation results of the SPS profile analysis for the fifth-grade students of SDN 262 Panyileukan can be seen in Figure 1 below.

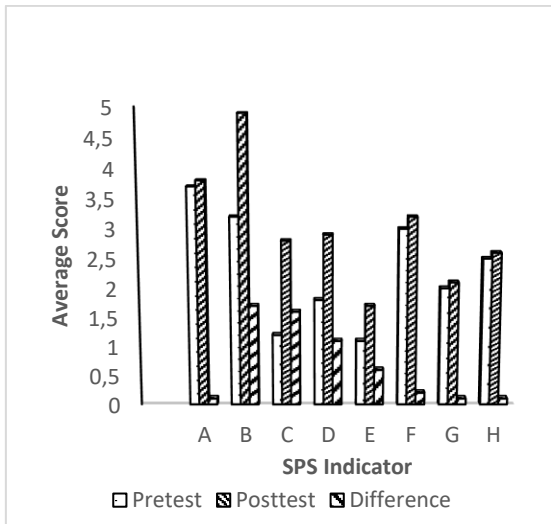


Figure 1 Students SPS Profile

Information:

- A= Observing
- B= Classifying
- C= Applying concept
- D= Predicting
- E= Interpreting
- F= Using tools and materials
- G= Communicating
- H= Questioning

Based on the above figure, each average score per aspect of science process skills (SPS) shows an improvement. SPS is crucial for students as it enables them to actively engage in the learning process, thus motivating them to satisfy their curiosity (Yuliati & Susianna, 2023). The first SPS indicator is observation, which increased with a difference of 0.1. In this stage, the teacher ensures that students understand what they observe, not just passively observing, but comprehending it. Observational skills involve gathering information using all senses, such as reading, listening, and watching (Matsna et al., 2023).

The second indicator is classification, which showed an increase with a difference of 1.7. This indicates a quite significant improvement. In the learning process to enhance classification skills, the application of the MURDER strategy is still in the comprehension stage. After students observe the learning materials, they proceed with the learning activities to classify the subject matter, such as

categorizing and grouping. According to Murdani (2020), characteristics of students who can classify in SPS include grouping based on specific characteristics found during observation. Furthermore, according to Mellyzar et al., (2022), the activity of classification can provide meaningful learning for students as they can directly discuss with their peers regarding the classification of the materials being studied.

The third indicator is applying concepts, showing an increase with a difference of 1.6. This improvement is due to the implementation of the advanced stage of the MURDER strategy, which is recall, being maximized. After students are provided with learning materials to observe and classify, the next step is to ensure that students can apply the concepts of the learning materials they have acquired through the recall stage. Students review the learning materials through active discussions with their peers. According to Andriyadi & Sukidjo (2020), the recall stage is an effort to transfer information obtained by students into long-term memory. During the recall stage in the learning process, students are directed to understand the concepts based on what they see, hear, and feel.

The fourth indicator is predicting, with an increase of 1.1. This improvement can be attributed to the continuation of the MURDER strategy, specifically the review stage. In this stage of the learning process to enhance the predicting skills, students engage in group discussions. The teacher provides worksheets to each group containing learning materials to maximize students' ability to predict and work on the worksheets. During this stage, the teacher assists students who are still facing difficulties in understanding the learning materials. According to Permatahati & Wangid (2019), the review stage in the MURDER strategy aims to identify and ensure that no students are experiencing difficulties anymore.

The fifth indicator is interpreting, with an increase of 0.6. To enhance students' interpreting skills, the implementation of the MURDER strategy is still in the review stage. In this stage, learning is conducted by requiring students to solve a problem related to the current learning

materials through group discussions. The research conducted by Kelana et al., (2020) showed that to improve interpreting skills, students need to ensure that during the learning and group discussions, they can solve a problem by taking notes from the discussions and drawing conclusions.

The sixth indicator is using tools and materials, with an increase of 0.2. To enhance students' skills in using tools and materials, the advanced stage of the MURDER strategy is developed. In this stage, the learning process involves students directly practicing experiments related to the learning materials. This hands-on practice provides direct experience for students to improve their skills in using tools and materials. While students are conducting experiments, the teacher guides and assists them if any student encounters difficulties. According to Andriyadi & Sukidjo (2020), in the developing stage, the teacher ensures that students understand and can apply the currently studied materials.

The seventh indicator is communicating, with an increase of 0.1. The final stage of the MURDER strategy is to review. In this stage, to enhance communication skills, students communicate the results of their discussions and experimental practices. The research conducted by Matsna et al., (2023) found that students should communicate their findings not only orally but also in the form of written reports. In this context, the review stage maximizes students by ensuring that they review what they have learned before communicating their work. As a result, students can effectively communicate their findings both verbally and in writing.

The eighth indicator is asking questions, with an increase of 0.1. Still in the same stage of the MURDER strategy, which is the review stage. In the learning activities to enhance questioning skills, students are given statements related to the learned materials, and then they are asked to generate questions based on their thoughts about the given statements. Based on the research by Matsna et al., (2023), students' curiosity can be observed from their clarity in

formulating questions about what they want to know and have understood.

CONCLUSION

The guided inquiry learning model with the MURDER strategy is effective in enhancing students' science process skills (SPS). This is evidenced by the increase in the average scores of students' SPS from the pretest to the posttest. Additionally, there is a significant difference between the SPS of the experimental group and the control group. Through well-implemented learning activities in each stage, the profile of each SPS indicator improved.

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