Edu Sains
Jurnal Pendidikan Sains dan Matematika
p-ISSN : 2338-4387
e-ISSN : 2580-3247

THE INFLUENCE OF GUIDED INQUIRY MODELS ON STUDENTS' SCIENCE PROCESSING SKILLS THROUGH REFLEX MOVEMENT PRACTICUM

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Abstract
The importance of Science process skills (SPS) in education is that as SPS develops, essential competencies will also improve, including students' scientific attitudes and problem-solving skills. SPS are still rarely assessed because teachers generally measure only cognitive learning outcomes. This research aims to determine the effect of the guided inquiry model on students' science process skills through a reflex movement practicum at SMAN 1 Lohbener. This quantitative research uses a quasi-experimental method with a posttest-only control design. The population of this study consists of XI MIPA, with the sample being class XI MIPA 1 as the experimental group with 16 students and XI MIPA 2 as the control group with 20 students. The instrument used was an essay test sheet on SPS based on five indicators: observing, classifying, predicting, concluding, and communicating (Hastuti & Wiyanto, 2019). The research results showed that the average score for the experimental class was 13,56, while the control class scored 10,95, with a significant level (α) = 0,05, S^2_{gab} = 6,48, t_{count} = 3,06 and t_{table} = 2,03. Because $t_{count} > t_{able}$, thus, hypothesis (Ho) is rejected. That means the guided inquiry model affects students' science process skills in the reflex movement practicum at SMAN 1 Lohbener.

Keywords: guided inquiry model, science process skills, reflex movement practicum

Abstrak
Pentingnya KPS dalam dunia pendidikan karena dengan berkembangnya KPS maka kompetensi dasar akan berkembang yakni sikap ilmiah siswa dan keterampilan dalam memecahkan masalah. KPS siswa masih jarang diukur karena umumnya guru mengukur hasil belajar kognitif biasa. Penelitian ini bertujuan untuk mengetahui pengaruh model inkuiri terbimbing terhadap keterampilan proses sains siswa melalui praktikum gerak refleks di SMAN 1 Lohbener. Jenis penelitian kuantitatif menggunakan *quasi experimental* dengan rancangan *posttest only control design*. Populasi penelitian ini yaitu kelas XI MIPA dengan sampel yaitu kelas XI MIPA 1 sebagai kelas eksperimen dengan 16 siswa dan XI MIPA 2 sebagai kelas kontrol dengan 20 siswa. Instrumen yang digunakan berupa lembar tes esai KPS berdasarkan 5 indikator yaitu mengamati, mengklasifikasi, memprediksi, menyimpulkan, dan mengkomunikasikan (Hastuti & Wiyanto, 2019). Berdasarkan hasil penelitian diperoleh rata-rata pada kelas eksperimen 13,56 dan kelas kontrol 10,95, dengan tingkat signifikan (α) = 0,05, S^2_{gab} = 6,48, t_{hitung} = 3,06 dan t_{tabel} = 2,03. Karena $t_{hitung} > t_{tabel}$, maka Ho ditolak, Artinya model inkuiri terbimbing berpengaruh terhadap keterampilan proses sains siswa pada praktikum gerak refleks di SMAN 1 Lohbener.

Kata kunci: *Model Inkuiri Terbimbing, keterampilan proses sains, praktikum gerak refleks*

INTRODUCTION

Education is one of the foundations of a person's life that must be built as effectively as possible, one of which is through school-based learning. In general, education is a process of acquiring knowledge, skills, and habits carried out by each individual (Abrori et al., 2023). This learning process takes place through teaching, training, and research. In addition, education can improve intelligence, noble character, and abilities (Abrori et al., 2023). One of the skills students are expected to have in school is science process skills.

Science process skills (SPS) are competencies that derive from fundamental abilities that, in principle, are already present in students. These skills encompass observing, classifying, predicting, formulating hypotheses, measuring, planning, controlling variables, interpreting, applying, concluding, and communicating (Hamidah, 2022). The importance of science process skills in education is because, with the development of science process skills, essential competencies will develop, precisely, students' scientific attitudes and problem-solving abilities. Consequently, this development enables the formation of students who are creative, competitive, innovative, and critical thinkers, equipping them to engage effectively in the competitive global society (Komisia et al., 2022). The utilization of SPS is important for scientific experiences and learning to develop skills for posing problems with solutions, which are applicable in the classroom and can also be beneficial in daily life (Fatin et al., 2021). One method to cultivate students' science process skills is to implement an approach that can make students active, thereby reducing teacher dominance during the learning process (Jaya et al., 2022; Mulyono & Ubaidillah, 2024). The guided inquiry approach is employed to enhance and activate students (Mulyono et al., 2024; Zega et al., 2021). Science process skills can facilitate students to participate actively, create long-term learning, establish appropriate habits akin to those of scientists in problem-solving and experimental planning, and enable students to learn the application of science rather than merely studying concepts and laws (Mahmudah et al., 2019; Mulyono et al., 2023). Based on this explanation, it is necessary and important for students' SPS to be trained and developed in biology learning.

Based on interviews conducted with biology teachers at SMAN 1 Lohbener, implementing biology practicum activities in schools remains infrequent (occasionally occurring). Regarding the results of interviews concerning SPS, the following information was obtained: (a) teachers generally assess standard cognitive learning outcomes, and (b) teachers have not previously evaluated learning outcomes using SPS-based questions.

One learning model that has the potential to enhance or develop SPS is guided inquiry. This assertion aligns with the perspective of Samal et al. (2023), who stated that the guided inquiry learning model is perceived as capable of enhancing and developing SPS because the learning process requires students to be active in making observations, formulating inquiries, collecting information, classifying, proving, communicating and draw a conclusion.

Guided inquiry is a student-centered learning model that provides opportunities for students to develop learning activities and practice their scientific and critical thinking capabilities. The guided inquiry process is implemented by familiarizing students with critical thinking through the process of observing, formulating scientific inquiries, hypothesizing, making predictions, planning inquiries to solve problems, taking measurements carefully and thoroughly, interpreting data acquisition, drawing conclusions, understanding the limitations of scientific research, and understanding how knowledge can be achieved and applying it in solving the problems faced (Rapsanjani et al., 2023; Yuliarti et al., 2023). Learning using this science process skills approach can be accomplished through guided inquiry learning models or practicum-based learning (Daniah, 2020).

Practical learning is a method of learning whereby students actively engage in experiments, thereby directly applying theoretical knowledge acquired and validating their comprehension to enhance their understanding of the subject matter (Hartama & Sianipar, 2022). The reflex movement practicum is chosen because this material is abstract, which presents considerable difficulty for students. Therefore, there is a necessity for pedagogical strategies that provide concrete experiences to students, such as practicum-based learning, which will help students understand and recall the concepts of the material that has been practiced. Students' science process skills can be trained through practicum methods because, during practicum activities, students can develop psychomotor, cognitive, and affective skills (Aulia et al., 2023).

Based on the explanation above, the author will research "The Influence of Guided Inquiry Models on Students' Science Processing Skills Through Reflex Movement Practicum at SMAN 1 Lohbener."

METHODOLOGY

This research uses quantitative methodology with an experimental approach. The research design used in this research is quasi-experimental with a non-equivalent control group design. This research took place in June 2024. The research location is at SMAN 1 Lohbener, situated at Jl. Raya Utama No. 50, Lohbener District, Indramayu Regency (45252). The population in this research are students from class XI MIPA, totaling 156 individuals (Students). The research sample comprised two classes. The sampling technique used was a non-equivalent control group design with a cluster sampling type. The instrument used in this research is an essay test, which is used to measure students' science process skills. The essay test uses indicators of science process skills. Scoring was conducted using a Likert scale (4, 3, 2, 1, 0).

RESULTS AND DISCUSSION

Table 1 presents the processed calculation results from the students' post-test (essay test sheet).

Table 1. Two Average Difference Test Results (t-test)

Classes	Average	Variant	S_{gab}	t_{-count}	t_{-table}
Using the Guided Inquiry Model	13,56	4,25	6,48	3,06	2,03
Using Conventional Models	10,95	8,25			

According to Table 1, the results of students' science process skills scores obtained a score of 3,06, whereas, at the 0,05 significance level, it was 2,03. Because $t_{-count} > t_{-table}$ means Ho is rejected and Ha is accepted, the guided inquiry model significantly influences students' science process skills in reflex movement material at SMA Negeri 1 Lohbener.

Table 2. Qualifications The Emergence of Mastery of Science Process Skills (SPS)

Indicators of Students' Science Process Skills	Experiment Class		Control Class	
	Percentage (%)	Category	Percentage (%)	Category
Observing	86	Very Good	73	Good
Classifying	59	Average	41	Average
Predicting	83	Very Good	78	Good
Concluding	55	Average	58	Average
Communicating	56	Average	92	Very Good
Average	68	Good	68	Good

According to Table 2, the average percentage of each indicator of science process skills for students in the class using the guided inquiry model is 68%, which is in the good category. For a more comprehensive comparison of the percentage results for each indicator of students' science process skills between classes using the guided inquiry model and those using the conventional model, refer to Figure 1.

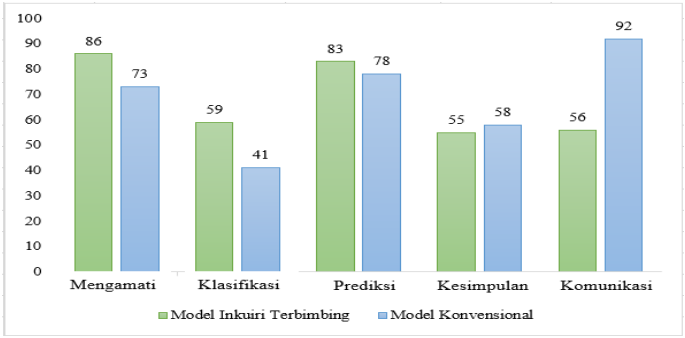

Figure 1. Percentage of students' science process skills in classes that use the guided inquiry model and classes that use the conventional model

Figure 1 shows that the class that uses the guided inquiry model is significantly different from the class that uses the conventional model. Specifically, the guided inquiry model is higher than the conventional model.

The calculation results of student response statements regarding learning have been presented in Table 5 as follows:

Table 3. Statement of Students' Response to Learning

Indicators	Percentage	Criteria
Actively participate in learning	88%	Generally
Read or Listen	100%	Entirely
See	94%	Generally
Create/Generate	94%	Generally
Observe	100%	Entirely
Generating motivation to learn	94%	Generally
Develop basic skills	100%	Entirely
Mode of learning a scientific approach	100%	Entirely
Supporting learning materials	94%	Generally
Average	**96%**	**Generally**

Table 3 shows students' responses to learning from existing indicators, all of which have a percentage of 96% with the general criteria.

According to Table 1. The results of data analysis for the two samples show that the average difference in students' science process skills in the class using the guided inquiry model is 13.56 compared to the average value for the class using the conventional model, which is 10.95. That indicates that students' science process skills in classes that use the guided inquiry model are better than in classes that use the conventional model. That is because the guided inquiry model encourages students to learn independently but still provides teacher guidance so students can practice their science skills.

The observing indicator in the experimental class obtained 86%, including the outstanding category. Meanwhile, the percentage obtained was 73% in the control class, including the good category. That indicated that students could explain the direction of stimulation for reflex movements through a flow diagram by observing the problem picture. Darmaji et al. (2019) stated that observation skills can develop other skills, such as inferring skills, communicating predictive actions, and concluding. That is in line with the perspective of (Suansah, 2020), who mentioned in her research that observation skills are the most essential skills so that students may quickly complete them. Apart from that, this skill is often honed by the assignments offered during online learning; teachers often require students to observe the material being studied and find facts using their senses, notably smell, sight, and touch. According to the perspective of Khairunnisa et al. (2019), which states that the observing aspect is the essential aspect of SPS that a person has, the assessment of the observing aspect shows that the basic SPS that students have is good. That also agrees with Hamidah (2022), who states that observing is the most

essential skill in acquiring knowledge and is used to develop other process skills. Aiman and Sunimbar (2020) state that students can directly observe their experiences and the consequences of the experiences experienced students, making concepts last a long time in students' brains so that learning concepts can survive when they are with their group friends. Field data shows that students can observe pictures on PowerPoint during learning so that they can explain the stages of reflex movements.

The classification indicator in the experimental class obtained a percentage of 59%, including the sufficient category. Meanwhile, the percentage reached 41% in the control class, including the sufficient category. Even though it is in the sufficient category, the classifying indicator has the lowest percentage because some students still have difficulty performing this skill. That indicates that students can still not correctly classify the data between the treatment and the response it causes. That shows that students need more learning and practice in identifying similarities and differences between objects or phenomena and grouping them in the same category. According to Aiman & Sunimbar (2020), in the classification indicator, which is considered low, students' ability to classify an object, in particular, is still lacking in mastery but can still influence improving science process skills in this classification indicator. According to Khairunnisa et al. (2019), classifying is a process skill for selecting diverse event objects based on their specific characteristics to obtain similar categories/groups of the event in question. Hamidah (2022) also states that the classification process includes several activities, such as looking for similarities, looking for differences, contrasting characteristics, comparing, and looking for the basis of classification. Based on field notes, many students are still confused about answering questions in LKPD number 3 regarding the type of reflex response.

The predictive indicators in the experimental class obtained 83%, including the outstanding category. Meanwhile, the control class reached 78%, including the good category. That indicated that students are able to predict how the eyes will respond to the events that have been demonstrated. That shows that students can predict future events based on previous observations and experiences or the availability of valid data. According to Khairunnisa et al. (2019), forecasting or predicting can be defined as anticipating or making predictions about everything that will happen in the future based on estimates of specific patterns, tendencies, or relationships between facts, concepts, and principles in science. Forecasting is estimating based on reliable observational data (Hamidah, 2022). Rahayu (2020) also states that if students can use patterns from their observations to suggest what might happen in situations they have not observed, they can predict. That is, by using data in the field, students can predict what events will occur based on question number 2 in the LKPD regarding the causes and effects of reflex movements.

The concluding indicator in the experimental class obtained a percentage of 55%, including the sufficient category. Meanwhile, the percentage obtained was 58% in the control class, including the sufficient category. That indicates that students can make conclusions from exemplary events based on the material taught. The conclusion that the control class performed better is evident in Figure 1. From Figure

1, it is clear that the post-test results of the control class exceed those of the experimental class by 3%. The low ability to conclude in the experimental class is due to the biology class from 12.30 to 15.30. After the break time, the students' focus was divided because they were still carried away by the atmosphere of joking around during the break time, especially when it was also close to home time, which divided the students' focus. In the conventional learning model, students are guided by the teacher to explain concepts again based on conclusions made in groups. Rahayu (2020) states that concluding skills need to be trained or familiarized because using written assessments will not be enough.

The indicator communication in the experimental class obtained a percentage of 56%, including the sufficient category. Meanwhile, the control class obtained a percentage of 92%, including the outstanding category. The communication ability of the control class is higher than that of the experimental class, as seen in Figure 4.3. Based on Figure 4.3, it can be seen that the difference in post-test results for students in the experimental class and the control class is 36%. The low ability to communicate in the experimental class was because, during data collection, the learning conditions were not conducive; as indicated by the biology lesson after sports lessons, students appeared to be concentrating when learning was broken. This results in students tending to be passive because they want to go home immediately. Sriyati et al. (2021) stated that communication is done verbally and in written form. That is strengthened by research by Suansah (2020), who researched improving students' science process skills. However, the indicators of students' science process skills did not increase after treatment, namely the communication indicator. That is because students do not easily understand abstract and complicated concepts if concrete examples do not accompany them during the learning process. According to Yunita & Nurita (2021), students will more easily understand complex and abstract concepts if concrete examples accompany the learning process because this is one of the reasons why science process skills need to be applied. Susannah (2020) states that the importance of mastering science process skills by students can make it easier for students to understand abstract concepts if they are learned through concrete objects and carried out by their students through direct learning experiences. Based on observations during learning, it was found that in the learning process, students were not used to explaining material through pictures, graphs, or tables, and many students still asked questions about the pictures in PowerPoint.

CONCLUSION

Based on the results of research that has been carried out about "The Influence of Guided Inquiry Models on Students' Science Processing Skills Through Reflective Movement Practicum at SMAN 1 Lohbener " the following conclusions were drawn. The practicum-based guided inquiry model on reflex movement material influences students' science process skills. That is demonstrated in the post-test of students' science process skills using the two-difference test. The average obtained is $t_{hing} = 3.06$ and $t_{able} = 2,03$. Since t_{he} thing> table has an experimental class average of 13.56 and

a control class average of 10.95, Ho is rejected. That indicates that the guided inquiry model influences students' science process skills. Description of students' science process skills in the reflex movement practicum in the class of XI MIPA SMAN 1 that used the guided inquiry model to practice students' science process skill in the reflex movement practicum at SMAN 1 Lohbener shows an average percentage of each indicator is 68% in the good category. The highest indicator is observation, with a percentage of 86%, and the lowest is a conclusion, with a percentage of 55%. In classes that use the conventional model, the average percentage for each indicator of science process skills is 68% in the good category. The highest indicator in the control class is communicating, with a percentage of 92%, and the lowest indicator for classification has a percentage of 41%.

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