THE EFFECT OF THE INQUIRY MODEL ON SCIENCE PROCESS SKILLS (KPS) AT SMAN 1 DARUL IMARAH

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Article Info	ABSTRACT
Email Corresponding Author: mahyana@serambimekkah.ac.id *Keyword:* Inquiry learning model; Science process skills; Learning outcomes	*Science process skills are an important aspect that students must possess to support their ability to use scientific methods in developing science. This study aims to determine the effect of the inquiry learning model on the science process skills of grade XI students at SMA Negeri 1 Darul Imarah Aceh Besar. The study used a quasi-experimental method with a quantitative approach, involving one class as a research sample consisting of 34 students. The research instruments consisted of a pretest, posttest, and student response questionnaire. The data were analyzed using normality tests, reliability tests, and t-tests. The results showed that the inquiry learning model had a significant effect on students' science process skills, as indicated by a t-value of 24.73, which was greater than the t-table value of 1.693 at a certain significance level with a degree of freedom of 32. In addition, student responses to the application of the inquiry model were also positive, with an overall average score of 67.10, which falls into the agree category. The conclusion of this study is that the inquiry learning model is effective in improving science process skills and has received positive acceptance from students, so it can be used as an alternative learning strategy to support learning outcomes in schools.*

PENDAHULUAN

In the modern era, technological developments have influenced almost all aspects of human life, including education. Education plays an important role in developing the potential, talents, and personality of individuals so that they can benefit themselves and their social environment (Wahyuni & Rizal, 2022). One important aspect of learning is science process skills (SPS), which include the ability to observe, conclude, measure, communicate, hypothesize, and conduct experiments. SPS serves to train students to acquire, develop, and apply scientific concepts, principles, laws, and theories in learning activities. Mastery of KPS is a crucial factor in physics education because it is directly related to students' understanding of concepts, critical thinking skills, and scientific problem solving (Mahyuna et al., 2023).

However, physics education in schools still faces a number of obstacles. Physics is often considered difficult because it demands a high level of intellectual ability, so many students find it difficult to understand its concepts. This results in low interest, lack of active participation, and misunderstanding of concepts, which leads to poor learning outcomes (Putriardi et al., 2023). Initial observations at SMA Negeri 1 Darul Imarah Aceh Besar show that most 11th grade students are still below the Minimum Completion Criteria (KKM). This condition is influenced by a monotonous learning model, a lack of practical activities, and a lack of opportunities for students to develop critical thinking skills through scientific activities.

One alternative to overcome this problem is the application of the inquiry learning model. This model emphasizes the active involvement of students in the process of discovering concepts through systematic, critical, and logical investigation activities. Thus, inquiry not only requires physical activity but also fosters students' confidence in discovering knowledge independently (Mahyana et al., 2019). Furthermore, the inquiry-based learning model based on scientific attitudes is not used in learning. The learning and discussion of living things conservation that has been carried out does not apply inquiry in the scientific attitude-based inquiry learning model, which is not used to train students' inquiry activities and scientific attitudes. (Apriana. At.al (2024). Previous studies have shown that the application of the inquiry model can improve students' science process skills and learning outcomes, as found by Sumarni et al. (2018) and Hartati et al. (2022).

Based on this description, this article discusses the issue of low science process skills and physics learning outcomes among students, which are influenced by a lack of variety in learning models. The importance of this study lies in the effort to find effective strategies to improve the quality of physics learning through the application of the inquiry model. The approach used is a conceptual study and empirical analysis of the results of observations and previous studies, so that it is expected to contribute to the development of more interesting, participatory, and effective physics learning methods.

METHOD

This study used a quasi-experimental method with a One Group Pretest-Posttest design. This design was chosen due to limitations in the field conditions that did not

allow for the use of a control group, but it could still be used to observe the effect of the treatment given to the research subjects (Sugiyono, 2019). A quantitative approach was used, with the aim of determining the causal relationship between the application of the inquiry learning model and students' science process skills.

The population in this study was all students in grade XI at SMA Negeri 1 Darul Imarah. The research sample was determined purposively, namely 34 students in class XI F-4 in the even semester of the 2024/2025 academic year. This class was selected based on preliminary observations showing that most students were still below the Minimum Passing Criteria (KKM), making it relevant to provide them with inquiry-based learning.

Research instruments were used to collect data in accordance with the variables studied (Muslihin et al., 2022). The instruments used included:

A learning outcome test consisting of 20 multiple-choice questions on static fluid material. This test was used in the pre-test and post-test stages to measure improvements in student learning outcomes. The validity and reliability of the instruments were tested in advance so that the data obtained had an adequate level of reliability.

A student response questionnaire in the form of a closed scale. This questionnaire was used to determine students' responses to the application of the inquiry model in physics learning, particularly in terms of engagement, motivation, and ease of understanding concepts.

The research procedure was carried out in the following steps:

1. Administering a pre-test to students to determine their initial abilities.
2. Conducting learning by applying the inquiry model to static fluid material.
3. Administering a post-test to measure learning outcomes after the treatment.
4. Distributing questionnaires to determine student responses to learning.

Data analysis techniques were performed quantitatively. Pre-test and post-test data were analyzed using a paired sample t-test to determine significant differences before and after treatment (Arikunto, 2013). In addition, student response questionnaire data were analyzed descriptively by calculating the percentage of each answer category, so that an overview of student response trends to inquiry-based learning could be obtained.

RESULT AND DISCUSSION

Based on the results of the study, the science process skills of grade XI students at SMA Negeri 1 Darul Imarah showed an increase after the implementation of the inquiry learning model. The average pre-test score was 55, indicating that the students' initial skills were still low and did not meet the Minimum Passing Criteria (KKM). After being taught using the inquiry model, the average post-test score increased to 79.85, indicating a significant improvement in the students' science process skills.

This difference in averages illustrates that the application of the inquiry model contributes positively to students' conceptual understanding, critical thinking skills, and skills in applying scientific methods. These findings are in line with the research by Sumarni et al. (2018), which shows that the inquiry model can improve students' physics learning outcomes at the high school level.

1. *Normality Test*

Before conducting the difference test, a normality test was first performed on the post-test data using the Liliefors test at a significance level of 0.05. The analysis results showed that the Lcount value was < Ltable, indicating that the data was normally distributed. Thus, the requirements for performing parametric analysis were met.

Table 1. Results of Post-test Data Normality Test

Class	N	Average	$L_{Calculated}$	t_{abel} (α =0,05)	Description
XI-F4	34	79,85	0,112	0,151	Normal

The normality of this data indicates that the increase in students' scores did not occur by chance, but can be further analyzed using parametric statistical tests, such as the paired t-test.

Table 2 Data Normality Test Result Postest

Standard Deviation	**5,837**	A statistical measure that shows how spread out the data is in a group from its mean value.
Calculated l	**0,179**	Calculated value for determining normality decision
Table l	**0,148**	The comparative value obtained from the l-table
Mean	**80**	Overall student scores

Source: Research results 2025

Based on the results of the normality test above using the lilifors test, the t-count value of the science process skills test data for the post-test is 0.179, while the t-

table is 0.148. Based on the decision-making criteria, the t-count value is > t-table (0.179 > 0.148), therefore the post-test data in this study is normally distributed.

2. *Reliability Test Results*

This section presents the reliability calculation results of the pre-test and post-test instruments using Cronbach's Alpha coefficient. The reliability test results in this study can be seen in the following table:

Table 3 Post-Test Item Reliability Test Results

No	Soal	Cronbach's Alpha	Description
1	Post Test	1.00	Very reliable because it is vulnerable value $0,80 < rn \leq 1,00$

Based on the table above, the Cronbach's Alpha value obtained in the post-test data is > 0.80, which means that based on the decision, the reliability value of the instrument is very reliable or the instrument is able to measure consistently and accurately.

3. *Hypothesis Test Results*

Data Analysis Initial and final scores were analyzed to determine the effect of the inquiry model on the science process skills of 11th grade students at SMA Negeri 1 Darul Imarah. The effect is measured based on the initial values (before the action) and the final values (after the action).

Table 4. Distribution of Initial and Final Scores for Science Process Skills of Grade XI Students at Darul Imarah Public High School 1

| Pretest	Postest	Pretest-Postest ($\sum$d)	d^2
1875	2715	840	24750

Based on Table 4.4 above, it can be seen that there are 34 students in grade XI at Darul Imarah Public High School. The total initial score obtained is 1875 and the total final score obtained is 2715. The range between the initial and final scores is 840, and the total range between the initial and final scores when squared is 24750.

Determining the t-value

$$t = \frac{Md}{\frac{\sum x^2 d}{n(n-1)}} = \frac{24{,}70}{\frac{-112.06}{34 \times 33}} = \frac{24{,}70}{\frac{-112.06}{1122}} = \frac{24{,}70}{-0{,}0999} = t\ 24.73$$

Based on the t-table, a level of 0.05 1.693 is obtained. After obtaining a calculated t-value of 24.73 and a table t-value of 1.692, the calculated t-value is greater than the table t-value, or 24.73 ≥ 1.693. Therefore, it can be concluded that Ho is rejected and Ha is accepted. This means that the use of the inquiry model has an effect on the science process skills of grade XI students at SMA Negeri 1 Darul Imarah.

Based on all the indicators explained in the table above, the researcher concludes that overall, students agree that the inquiry model should be used in the teaching and learning process because this model has an effect on the science process skills of grade XI students at SMA N 1 Darul Imarah, as can be seen from the overall average of 67.10. The questionnaire recapitulation according to the indicators can be seen in the following graph:
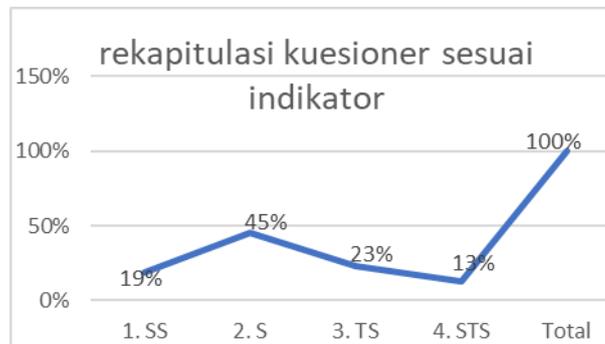
Based on the graph above, it shows a summary of the questionnaire according to the indicators from a total of 20 statements. The results obtained were 19% strongly agree, 45% agree, 23% disagree, and 13% strongly disagree, with a total of 100%.

It can be concluded that the inquiry model can be used in the teaching and learning process because this model has an effect on the science process skills of grade XI students at SMA N 1 Darul Imarah. It can be concluded that the inquiry model can be used in the teaching and learning process because this model has an effect on the science process skills of grade XI students at SMA N 1 Darul Imarah.

The results of this study indicate that science process skills can be developed in students by using the inquiry model to obtain maximum science process skills. Based on the t-test calculation, the hypothesis with a degree of freedom of 34 - 2 (df = 32) is 1.693 and the value is 24.73. This means that = 24.73 > = 1.693.

Therefore, it can be concluded that the inquiry learning model has an effect on the science process skills of grade XI students at SMA Negeri 1 Darul Imarah. The results of this study are in line with Hidayati's (2020) research, which shows that the inquiry learning model has an effect on students' science process skills in the material on changes in the form of objects, where > 2.32 > 1.66, so Ha is accepted. In terms of scientific attitudes, the results of the questionnaire for class.The control group scored 3.51 and the experimental group scored 3.62. Both groups scored high, but the experimental group scored higher than the control group (3.51 < 3.62). It can be concluded that the inquiry learning model had an effect on students' scientific attitudes.

Similar research was also conducted by Damian et al. (2024). The results of the study showed that 1) t_count = 3.181 > t_table = 1.684, which means that there is a significant effect on test results. Students' science process skills differ significantly between students who use the inquiry training model and students who use the traditional teaching model.Test results. Students' science process skills differ significantly between students who use the inquiry training model and students who use the direct learning model; 2) the N-Gain calculation results show that the increase in science process skills is moderate with a percentage of 60.5%; 3) the results of the percentage calculation of the implementation of the inquiry training model show that the percentage is 88% with a very good criterion. In addition, when viewed from the questionnaire that has been given, overall students agree with the use of the inquiry model in the learning process. Teaching science process skills, this can be seen based on the overall average of 67.10. Therefore, with this score, it can be interpreted that students agree with its use in the teaching and learning process in class XI at SMAN 1 Darul Imarah.

KESIMPULAN

Based on the results of research and data analysis obtained, the application of the inquiry model to the science process skills of Grade XI students at Darul Imarah State High School 1 leads to the following conclusions:

1. The inquiry learning model has an effect on the science process skills of Grade XI students at SMA Negeri 1 Darul Imarah. This is based on the hypothesis testing with

a degree of freedom of 34 - 2 (df = 32) of 1.693 and a t-value of 24.73, which means that t-value = 24.73 > t-table = 1.693.

2. Based on the overall response scores, students agreed that the use of the inquiry model in the teaching and learning process was effective in developing their skills. scientific process, this can be seen based on the overall average of 67.10 agreeing

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