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The Effect of Strengthening Asking Skills with the Guided Inquiry Learning Model on Students Learning Outcomes on Rotation Dynamics

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Abstract: This study aims to determine the effect of strengthening questioning skills with the guided inquiry learning model on student learning outcomes. This type of research is quasi-experimental. The population in the study were all students of class XI semester II with a sample of class XI IPA 3 and class XI IPA 4, each of which consisted of 36 students. Sampling in this study was carried out randomly. The research design was a two group pre-test post-test design. The instrument used in the study was a multiple choice test consisting of 20 questions and post-test result with an average score of 76.94 for the experimental class and 70.13 for the control class. The result of the t-test stated that there was a significant influence between the learning outcomes of students who used strengthening asking skills with the guided inquiry learning model and learning without being given reinforcement of asking skills in class XI semester II students at Madrasah Aliyah.

Keywords: Guided inquiry learning models; Learning outcomes; Questioning skills; Rotation dynamics

Introduction

Education is a basic skill that will support a teacher's ability to explain his duties, meaning that the high and low motivation of a teacher will be seen from the efforts made in developing his education (Niemi & Kousa, 2020). One of the problems faced by our world of education is the problem of weak learning processes. Children are less motivated to develop their thinking skills when in the learning process (Papavlasopoulou et al., 2019). The learning process in the classroom is directed at thte child's ability to memorize information, the child's brain is forced to remember and hoard various information without being required to understand the information he remembers to relate it to everyday life. This fact applies to all subjects (Russell, 2019). Science subjects cannot develop children's thinking skills critically and systematically, because thinking learning strategies are not used properly in the learning process in class (Alsaleh, 2020).

Physics is a branch of natural science which has the nature of physics as a product, physics as an attitude and physics as a process (Usmeldi & Amini, 2019). Scies is expected to be a vehicle for students to learn about themselves and the environment and apply it in everyday life (Chen et al., 2020). Science learning should use a learning model that can bring students into real situations, where students can see and prove their own knowledge based on existing facts and gain concrete experience.

Basic skills in teaching are skills that require programmed practice to master them. The assignment of these skills allows a teacher to be able to manage learning activities effectively (Rashidov & Rasulov, 2020). Teachers are expected to be able to improve the quality of the quality of the learning process by providing basic teaching skills (Sultana, 2019). Asking skills is the one of the skills that must be mastered by the teacher, because asking questions will get responses from the other parties (Ballakrishnan & Mohamad, 2020). The skill of asking questions really needs to be

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mastered by the teacher to create effective and enjoyable learning, because at almost every stage of learning the teacher is required to ask questions asked also determines the quality of student answers.

The ability to answer questions is one of the language skills that children have (Qurnia & Kusyairy, 2017). The ability to answer questions is the child's ability to answer questions and each answer put forward is a series of words that contain elements of subjects, predicate, object, and complement (Guo et al., 2022). There are 2 factors that influence the ability to answer questions, namely internal factors including health, intelligence, desire to communicate, motivation/encouragement and external factors including family environment and school environment (Jakavonytė-Staškuvienė & Barkauskienė, 2023).

The skill of asking questions really needs to be mastered by the teacher to create effective and fun learning, because at almost every stage of learning the teacher is required to ask questions, and the quality of the questions the teacher asks will determine the quality of the students. Questioning skills that need to be mastered by the teacher include basic questioning skills and advanced questioning skills (Mulyasa, 2009). Basic questioning skills include asking questions clearly and concisely, giving references, focusing attention, switching turns, distributing questions, allowing time to think, and giving directions. Advanced questioning skills are a continuation of basic questioning skills (Rebele & St. Pierre, 2019). Advanced questioning skills that need to be mastered by teachers include changes in cognitive level demands, setting the order of questions, tracking questions, and increasing interaction (Sugihartini et al., 2020).

The focus of this research is to measure how the influence of learning physics on strengthening asking skills in the learning process and practicum on Rotation Dynamics at Madrasah Aliyah 2 Medan. However, there is still a need for development or innovation in attitude assessment, especially in physics lessons. Researchers made observations by giving questionnaires to students of class XI IPA Madrasah Aliyah 2 Medan. The results of the questionnaire stated that out 70 students only 19% or 13 students liked the field of physics study. Data from the questionnaire results showed that physics is indeed a field of study that students are less interested because there are too many formulas that cause students not to be interested, the learning process carried out by the teacher in class still tends to be lecturing, practicum and learning media are rare, the teacher also rarely interacts by asking questions and answer to students during learning.

Responding to these existing problems, a student-oriented learning model is needed so that learning is more student-centered, not only teacher – centered. The learning model in question is the guided inquiry learning model by using the strengthening of questioning skills (Palupi et al., 2020). This model is certainly expected to provide changes to physics learning outcomes to be better than before. Inquiry learning has several stages, namely defining problems, formulating hypotheses, conducting experiments, processing and analyzing data, testing hypotheses to making conclusions (Nurhayati et al., 2021). This learning model will challenge students to always be active during the learning process while encouraging students to optimize their skills and abilities (Wahyuni et al., 2017).

According to Kuhlthau et al. (2007) guided inquiry is an effective way of learning to prepare students to think deeply about a subject, so that they can succeed in authentic tests. Guided inquiry targets students' assessments of situations related to processes (Wen et al., 2020). As a result, students have meaning and application of learning in their lives. Low student interest in learning affects student learning outcomes in Physics subjects in class XI IPA Madrasah Aliyah Negeri 2 Model Medan. So far, 47% (32 students) out of 67 students stated that they only got Physics scores in the satisfactory category, which ranged from 50 to 79. The low learning outcomes were more or less influenced by variations in the use of learning models by teachers. During this time the lecture method more often, and occasionally assigned group study.

The observation results also stated that 41% (29 students) sometimes asked if there was material they didn't understand, 30% (21 students) never asked if there was material they didn't understand, 20% (14 students) never asked because they didn't understand at all, and only 9& (6 students) always asked if there was material they didn't understand. Based on these results it can be seen that only a few students always asked if there was material they did not understand and more students were lazy to ask and never even asked if there was material they did not understand. This needs to be overcome by teaching the teacher a way that will strengthen the skills of asking questions in teaching.

Based on the description above, researchers are interested in conducting research with the aim of knowing how the effect of strengthening the questioning skills used by the guided inquiry leaning model has on student learning outcomes.

Method

This research was conducted at MAN 2 Model Medan which is located at Jl. Willem Iskandar No.7A, Medan Tembung, Medan City, North Sumatra, and held in April Semester I TP. 2022/2023. The population in

this study were all students of class XI IPA Semester I TP. 2022/2023 which has 9 classes. The sample in this study consisted of two classes that were selected randomly cluster side, that is, all classes had the opportunity to be sampled. Class samples were taken from the population, namely 2 classes, one class was used as an experimental class totaling 36 students by applying strengthening questioning skills with the guided inquiry learning model and one class was used as a control class totaling 36 students with guided inquiry learning model without strengthening questioning skills. The research method is research with a 4-D by Thiagarajan & Samuel (1074) is define, design, develop, and disseminate.

Data collection techniques in the form of observation, teaching, documentation, and questionnaires. Observation and documentation were carried out to obtain the initial data of the study, teaching to know students questioning skills, and questionnaires were used to obtain the final data of the study. This type of research is quasi-experimental research design as shown in Table 1.

Tabel 1. Two group pre-test-post-test design

Class	Pretest	Treatment	Posttest
Experiment	Y_1	X_1	Y_2
Control	Y_1	X_2	Y_2

Description

Y_1 : initial ability test (pre-test)
Y_2 : final ability test (post-test)
X_1 : learning by strengthening questioning skills with the guided inquiry learning model
X_2 : learning without strengthening questioning skills with the guided inquiry model

Before carrying out learning activities, an initial test was carried out to determine the level of students' initial ability on rotation dynamics in the control class and the experimental class. This learning outcomes test was in the form of multiple-choice questions with 5 possible answers out of 20 questions which had previously been tested for validity by two physics lecturers and 36 students who had studied rotation dynamics. The validity of research instrument is the level indicated by the test that measures what it is intended to measure (Surucu & Maslakci, 2020). The principle of test is valid, not universal (Sukardi, 2013). After the pretest data was obtained, the data were analyzed using the normality test, namely the Lilliefors test, homogeneity test and variance similarity test. After that, a two-party t-test hypothesis test was carried out to determine the students' initial abilities in the two sample groups, in this case the initial abilities of the two samples must be the same. Furthermore, the researcher taught the material of rotation dynamics in the two classes. The experimental class was taught by being given reinforcement of asking skills with the guided inquiry learning model, while the control class was taught by the same model without being given reinforcement of asking skills. Differences in the final results can be determined by post-test using one party t-test to determine the effect of strengthening questioning skills using the guided inquiry model on student learning outcomes.

Result and Discussion

Research Result

The data described in this study include data on students' physics learning outcomes on rotation dynamics which are given different treatments, namely learning by strengthening questioning skills using the guided inquiry learning model, and learning using the same learning model without being given reinforcement of asking skills. The results of the experimental class and control class students' pre-test data can be seen in the Table 2.

Table 2. Frequency distribution of pre-test data for both classes

Value intervals	Experiment Class Frequency	Control Class Frequency
20 – 26	4	5
27 – 33	1	7
34 – 40	15	9
41 – 47	3	5
48 – 54	7	6
55 – 61	6	4
Total	N = 36	N = 36
Average	42.22	39.16

The experimental class post-test result can be seen in Table 3.

Table 3. Post-test Experiment Class Data Frequency Distribution

Value Intervals	Frequency	Average
58 – 63	3	
64 – 70	6	
71 – 76	8	76.94
77 – 82	9	
83 – 88	7	
89 – 94	3	
		N = 36

The results of the control class post-test can be seen in Table 4. Strengthening Asking Skills with the Guided Inquiry Learning Model of students in the control and experimental classes as shown in Figure 1.

Table 4. Frequency Distribution of Control Class Post-test Data

Value	Frequency	Average
55 – 58	4	
59 – 64	6	
65 – 70	10	
71 – 76	7	70.13
77 – 82	6	
83 – 88	3	
		N = 36

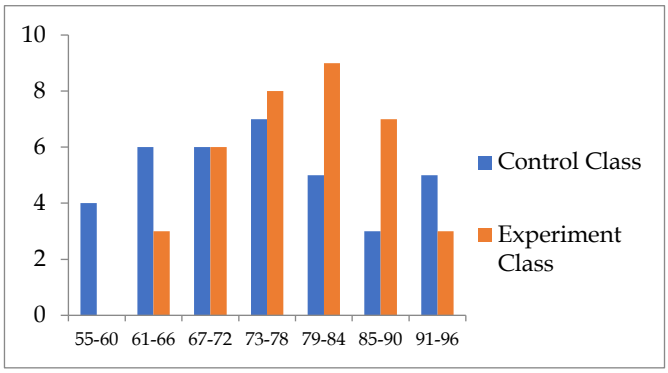

Figure 1. Post-test control class and experiment class

Based on the picture above, it is obtained that the average ability of asking skills in the experimental class is higher than the control class. The data normality test is prerequisite test regarding the feasibility of data to be analyzed using parametric statistics or nonparametric statistics. Through this test, a research data can be seen in the form of data distribution, that is whether it is normally distributed or not (Sudjana, 2017). The pre-test and post-test data normality tests for the experimental class and control class were used to determine whether the pre-test and post-test data were normally distributed. The normality test was carried out by the Liliefors tests (Sulewski, 2020). The results of the pre-test and post-test data normality tests for two classes are presented in Table 5. Table 5 shows that $L_{table} > L_{count}$, so it can be concluded that the data comes from a normally distributed population.

Homogeneity test was carried out to find out whether the sample class came from a homogeneous population or not and the sample used in the study could represent the entire existing population. The data homogeneity test was carried out by the F test. The details are shown in Table 6.

Table 5. Pre-test and post-test Data Normality Test

Description	Experimental class		Control Class	
	pre-test	post-test	pre-test	post-test
L_{count}	0.14	0.08	0.12	0.13
L_{table}				0.14
Conclusion	normal	normal	normal	normal

Table 6. Pre-test and post-test Data homogeneity Test

Value	Pre-test		Post-test	
	Experiment	Control	Experi-ment	Control
F_{count}		1.27		0.12
F_{table}		1.74		1.74
Conclusion		Homogen		Homogen

Table 6 shows that the data obtained is homogenerous or can represent the entire existing population. The summary of the calculation of the hypothesis test for the pretest ability of the experimental class and the control class can be seen in Table 7.

Table 7. Summary of pre-test Data using the T test

Data	Average	t_{count}	t_{table}	Conclusion
Experimental	42.22			The initial ability of
		1.22	1.99	students in
Control	39.16			both classes is the same

Table 7 shows that the initial abilities of the experimental class students are the same as the initial abilities of the control class students in the subject of Rotation Dynamics. The result of the post-test in the experimental class were given treatment obtained an average value of learning outcomes of 76.94 while for the control class it was 70.13. the average post-test score for the experimental class is higher than the average post-test score for the control class as shown in Table 8.

Table 8. Summary of post-test data t-test calculations

Data	Average	t_{count}	t_{table}	Conclusion
Experiment	76.94			Student learning outcomes in the
		3.24	1.66	experimental class were
Control	70.13			higher than those in the control class

Based on table 8, the post-test values obtained are $t_{count} > t_{table}$, namely (3.24 > 1.66), then Ho is rejected and Ha is accepted, in other words, student learning outcomes in the experimental class are better than student learning outcomes in the control class, meaning that there is the effect of strengthening questioning skills using the guided inquiry learning model on student learning outcomes in the subjects of Rotation Dynamics in Class XI Semester I MAN 2 Model Medan T.P 2022/2023. The result of observing students' questioning skills are presented in Table 9.

Table 9. Students Ask Observations

Meetings	Questions					
	(1)	(2)	(3)	(4)	(5)	(6)
1	3	4	2	3	1	0
2	9	8	4	3	2	1
3	8	10	4	4	2	1
4	9	11	5	4	2	1
5	10	9	4	6	3	2
6	12	10	5	5	4	1
7	11	10	4	3	2	1
8	10	11	5	4	1	2
Total	71	73	32	32	17	29

Description:
(1) Students ask according to context
(2) Students ask questions according to context but related to everyday life
(3) Students ask out of context
(4) Students answer other students' questions
(5) Students develop previous questions
(6) Students provide new ideas

The summary of each meeting for each reinforcement ability asks students as shown in Figure 2.

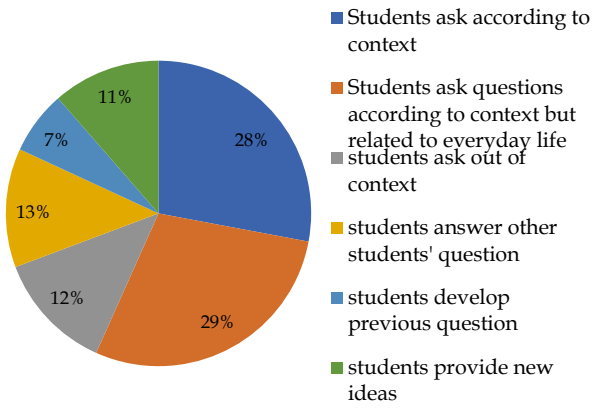

Figure 2. Students' questioning reinforcement ability for each meeting

Based on Figure 2, the highest percentage is obtained in the category of students asking according to context but related to everyday life and the lowest percentage in the category of students developing previous questions. Asking questions in the learning process has an effect on increasing students' thinking power and can make the learning atmosphere more active. Observation of questioning skills was only carried out in the experimental class.

Discussion

Research shown that there is an effect of strengthening skills using the guided inquiry learning model on the learning outcomes of class XI students on the subject matter of Rotation Dynamics in Class XI Semester I MAN 2 Medan Model T.P 2022/2023.

This can be proven by the presence of student knowledge data in the experimental class and control class. The pre-test average value obtained by the experimental class was 42.22, while the control class was 39.16. the average post-test scores for the two classes were different, where the experimental class earned an average score of 76.74 while the control class earned an average score of 70.13. These data can show an increase in learning outcomes between the experimental class and the control class. The knowledge of the experimental class students by being given the strengthening of their asking skills with the guided inquiry learning model on Rotation Dynamics material was better that that of the control class students. This means that student learning outcomes with strengthening asking skills are better than student learning outcomes without strengthening asking skills.

Researchers carry out learning according to the syntax or stages of the guided inquiry learning model, namely presenting problems, formulating hypotheses, drawing conclusions, and communicating experimental results. Specifically for the experimental class, when researchers carry out learning using the guided inquiry learning model the researcher also provokes students to ask questions that arise at several stages of learning. The researcher gave several questions related to the day's subject matter until the students returned to ask other things that were still related to the questions asked. At the end of the lesson, the researcher gave questions to each student. Blank paper is useful for students to write down questions that have not been asked during learning. Questions given by students can be in the form of questions related to that day's subject matter, questions that are appropriate to the day's lesson but related to everyday life, questions that are outside the context of that day's lesson, student questions that answer which gives new ideas. In the control class, learning was also carried out using the guided inquiry learning model. The difference is that researchers do not provide reinforcement of skills to students during the learning process. Researchers also did not give question sheets to students at the end of learning.

The results showed that there was an effect of strengthening questioning skills with the guided inquiry learning model compared to leaning without questioning skills on student learning outcomes in the subjects of Rotation Dynamics in Class XI semester I MAN 2 Model Medan TP. 2022/2023. This is evidenced by the differences in student learning outcomes in the experimental class and the control class. The average pre-test score of the experimental class students was 42.22 and the average post-test score of the experimental class students was 76.94, while the average pre-test score

of the control class students was 39.16 and the average post-test score of students in the control class learning is 70.13. This proves that student learning outcomes using skill reinforcement are better that without strengthening questioning skills even with the same learning model. In accordance with the Minimum Completeness Criteria (KKM) that apply at MAN 2 Model Medan is 75, the average post-test score of the experimental class students is 76.94 and is classified as complete. This research is also almost similar to the research conducted where they conducted research to find out differences in learning outcomes for Class VII student of SMP Negeri 2 Imogiri in the 2017/2018 academic year between learning using the inquiry learning model (Pramudia & Sujatmika, 2018). The result obtained from his research are that the average learning outcomes and questioning skills of students using the inquiry learning model are higher than the learning outcomes and questioning skills of students using the direct learning model.

Conclusion

Based on the result of the research conducted, it was found that there was an effect of strengthening questioning skills with the guided inquiry learning model on student learning outcomes in the subjects of Rotation Dynamics in Class XI Semester I MAN 2 Model Medan TP. 2022/2023.

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