



Efforts to Improve the Understanding of Darun Nasya Junior High School Students on Static Electricity Materials by Using the *Inquiry-Based Learning Learning Model*

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Abstract. Education has an important role in improving students' understanding of scientific materials, especially physics. This study identifies the low knowledge of junior high school grade IX students regarding the concept of static electricity, and this research aims to improve the understanding of Darun Nasya junior high school students towards static electricity materials through the application of Inquiry-Based Learning (IBL) learning model. The method used is an experiment with two groups: the experimental group using the IBL model and the control group using conventional learning methods. Data was collected through pre-test and post-test tests and by observing student activities. The results showed a significant improvement in the understanding of the concept of static electricity in the experimental group. The average post-test score of the experimental group increased from 50% to 80%, while the control group only experienced a marginal increase. This shows that the Inquiry-Based Learning model can improve students' understanding of static electricity materials. This study suggests applying the IBL model as a more effective learning alternative to understanding junior high school physics material.

Keywords: Inquiry-Based Learning, Static Electricity, Learning Methods, Student Understanding, Classroom Action Research

INTRODUCTION

Education is an effort to improve a person's understanding of a material or science obtained through the learning process. In education, learning involves digging up information to find meanings that are relevant to each individual's perspective, thus encouraging deep understanding (Abdul Razak; Satria Wiguna, 2022). Education is limited to conveying

knowledge and functions as a forum for forming positive character and a place for individuals to develop their potential (Ministry of Education and Culture, 2021). In line with Law No. 20 of 2003 concerning the National Education System, education not only discusses the subject matter but covers all aspects that play a role in optimizing human potential holistically.

As part of science education, physics is one of the oldest disciplines, and it has its roots in the natural sciences, chemistry, biology, and mathematics (Adnan, Gunawan, 2019) through the rapid development of science since the scientific revolution in the 17th century (Noperman, Feri., 2020). Physics has developed into a science that explains natural phenomena and inspires other fields of research, including mathematics and philosophy (Sanjayanti, et al., 2021). Contrary to the perception of many people who view physics only as a collection of formulas, physics is actually based on the understanding of concepts and theories that can be measured and expressed in certain units (Osa Pauliza).

The role of physics is very important in technological advancement, so it needs to be taught from an early age, starting at the Junior High School (SMP) level. In the 2013 curriculum for high school/MA, as explained through Permendikbud No. 59 of 2014, physics learning aims to enable students to master basic concepts, build a deeper understanding, and form a positive attitude during the learning process (Arifin et al., 2021). One very important concept to learn is static electricity. This phenomenon is frequent in everyday life and has a diverse impact that demands a fundamental understanding to avoid risks that may arise.

Static electricity is an imbalance of electrical charge in an object in a stationary state, in contrast to dynamic electricity, where the charge is always moving. This static electricity occurs through friction between objects, known as "charging by friction," which results in the displacement of electrons and causes different charges on these objects (Jumini Sri et al., 2022). This simple phenomenon, known since Thales of Miletus' experiments on amber (Gatriyani, Ni Putu, et al., 2023), became the basis in physics and showed the interaction of charges in various materials. This understanding of static electricity helps explain the basic electrical phenomena we encounter.

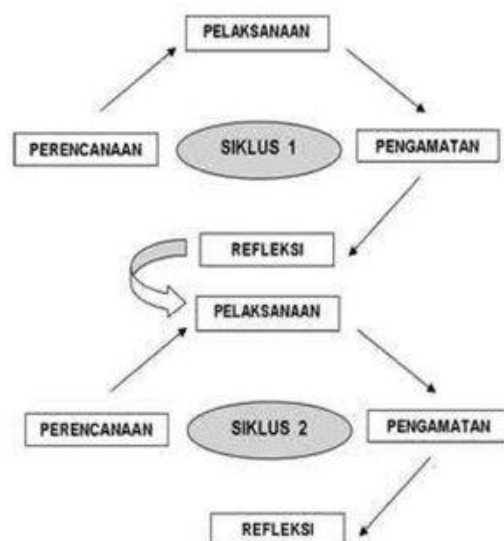
Although many students consider physics difficult because it is perceived only as a collection of formula memorization, this challenge should motivate teachers to provide innovative, precise, and interesting learning. Interesting learning can help students understand the material well so that they can improve their understanding of the concept of static electricity.

To achieve this goal, effective learning methods are needed so that students can master physics well. One method that can be used is Inquiry-Based Learning (IBL), which encourages students to understand physics in more depth through active engagement. In this method, the teacher acts as a facilitator and motivator who encourages students to think critically and analytically. According to Usman (2005), the inquiry method provides an opportunity for students to be directly involved in the learning process, while Kunandar (2010) added that this method allows students to utilize their full potential. With the application of this approach, it is hoped that students' understanding of basic concepts of physics, such as static electricity, can improve and help them see their application in daily life.

METHODS

Classroom Action Research Method (PTK)

The method used in this study is Classroom Action Research (PTK), which is a type of research that aims to find practical solutions to factual problems that are local, occurring in the classroom or in the school where the researcher is located. Arikunto (2008: 3) stated that Classroom Action Research is an effort to observe learning activities in the form of actions that are deliberately raised and occur together in a class. The PTK model used in this study is the spiral model from Kemmis and McTaggart (1988). This model allows researchers to continuously evaluate and improve learning strategies based on the feedback obtained from each cycle.



The model developed by Kemmis and McTaggart involves four stages carried out in sequence: planning, implementation, observation, and reflection (Wulandari, Esti, and Banun Havifah., 2023). The four stages are mutually sustainable and sustainable. The first cycle is carried out based on the identified problems, and if the results are still inadequate, then the next cycle will be carried out as an improvement from the first cycle. This cycle will be stopped if the research results have met the expected objectives (Anugrah, Muhamad., 2019).

Cycle Implementation

Cycle I

Based on the results of observations of problems that arise in the classroom, an action plan is prepared using the Inquiry-Based Learning (IBL) model, which requires students to be able to think critically and analytically. This model was chosen because it is considered to be able to provide a more in-depth and meaningful learning experience for students. In this cycle, students are expected to understand the basic concepts of static electricity through an active and participatory learning process. The action planning is made through intensive discussions between classroom teachers and peers to ensure appropriate steps in the implementation of learning, as well as considering various relevant pedagogical aspects.

The next step is to carry out actions in accordance with the plan that has been prepared. In its implementation, students were given material in the form of PowerPoint presentations explaining the basic concepts of static electricity. These presentations are designed to provide a solid initial understanding, which is then used as a basis for further analysis of the

information. Students are given the freedom to conduct analyses independently or in groups, with the aim of increasing collaboration and knowledge sharing.

In this learning process, students are actively involved in finding answers to questions or problems given by the teacher. This approach is expected to build students' curiosity and investigative abilities so that they are more skilled in solving problems. After the investigation process, the results of the students' findings are used as evaluation materials to measure the extent to which the learning objectives have been achieved. This evaluation covers a variety of aspects, including concept understanding, analytical abilities, and critical thinking skills.

The evaluation results are also reflection material for teachers to improve and perfect the learning process in the next cycle. By reflecting, it is hoped that teachers can identify the strengths and weaknesses of the applied learning model and formulate more effective strategies for the next cycle. Thus, it is hoped that learning with the IBL model can provide better and optimal results for students' academic development.

Cycle II

The action planning in the second cycle is made based on the results of deep reflection from the first cycle. In the evaluation, several aspects were found that needed to be improved to achieve a better understanding of static electricity materials from students. Therefore, although the actions implemented in this cycle are generally the same as in the first cycle, there are some adjustments and additions that are considered important. One of the main changes is the opportunity for students to experiment with simple tools using plastic straws and tissues. This practical approach aims to provide a more in-depth hands-on experience, so that students can understand the phenomenon of static electricity in a more concrete way and know its application in daily life.

This experiment is designed so that students can see and experience for themselves how static electricity works, increase curiosity, and reinforce concepts that have been learned through previous presentations and discussions. The aspects observed in this cycle are still related to the implementation of learning activities and student activities during the learning process, including the active participation of students, their ability to work together, and understanding concepts through experiments carried out.

Based on the results of actions and observations made during the learning process, re-evaluation was carried out using a post-test to collect data on students' understanding of static electricity materials taught using the Inquiry Based Learning (IBL) method. The data from this post-test was then analyzed to assess the effectiveness of learning and find out the extent

of improvement in students' understanding after conducting experiments and more in-depth discussions. The results of this evaluation will also be a reflection material for the next learning cycle, with the hope of continuing to improve the quality of learning and overall student learning outcomes. With continuous improvement, this learning model is expected to be an effective method in teaching physics concepts, especially abstract materials such as static electricity.

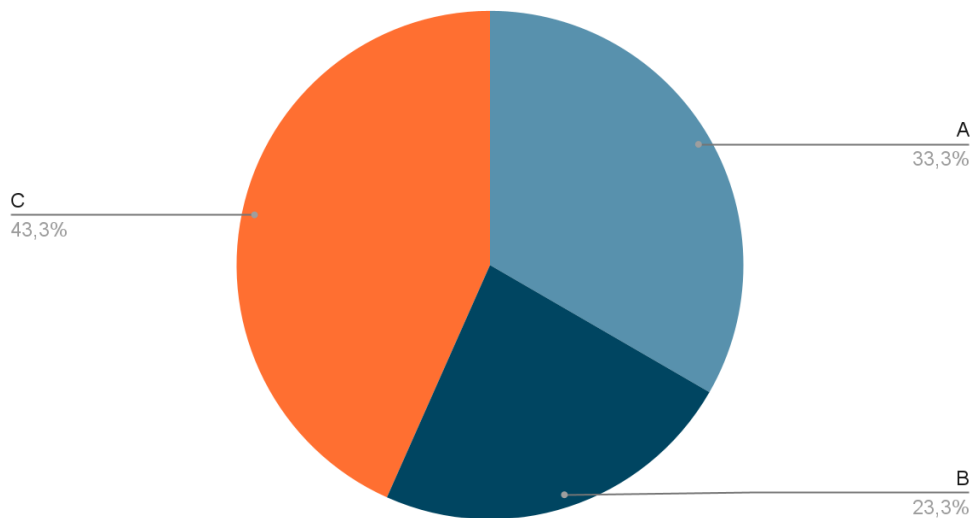
Location and Subject of Research

This research was conducted at the Rojaul Huda Darun Nasya Islamic Boarding School. The class used for research is grade IX of junior high school. The researcher chose class IX because of low motivation and learning outcomes that were still below the KKM. This research was carried out in November of the odd semester of 2024/2025, and the subjects in this study were 30 students in grade IX of Darun Nasya Junior High School, consisting of 22 male students and 8 female students.

DISCUSSION

From the calculation results, the distribution of student scores in the first cycle was obtained as follows:

SIKLUS I



A grade (33.3%) As many as 33.3% or 10 students managed to obtain A grades. This group is likely to have mastered important concepts well and can apply them effectively in a given exam or assignment.

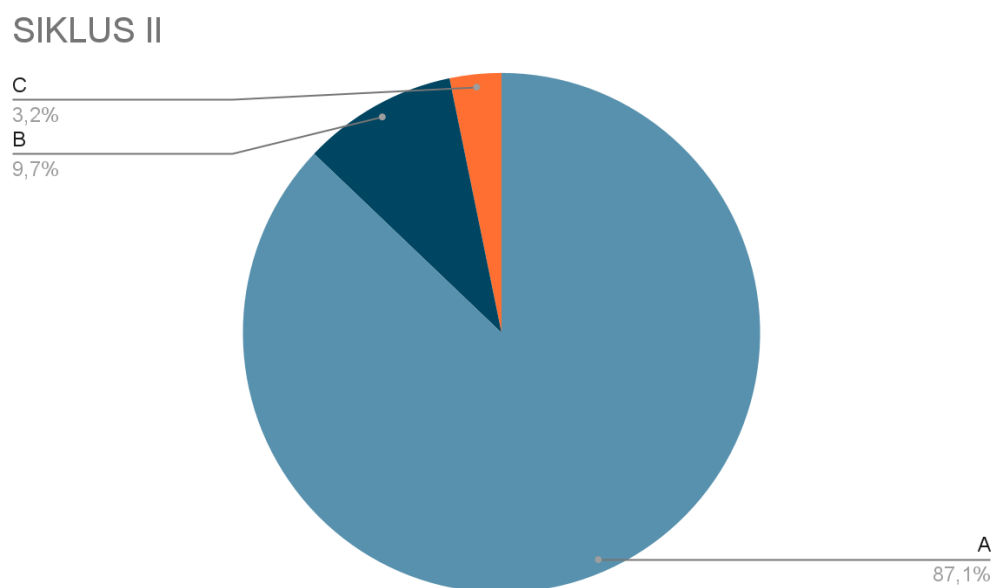
A B grade (23.3%) as many as 23.3% or 7 students obtained a B grade. Although the number was smaller compared to the students who obtained an A grade, this group showed a fairly good understanding, although there may be some areas that still need to be improved or further deepened. A value of B describes adequate results but indicates that there is room for improvement.

A grade of C (43.3%) as many as 43.3% or 13 students obtained a grade of C. This group showed that almost half of the total students still needed more attention to understand the learning material. A grade of C usually indicates that the student's understanding of the material is still not optimal, so further evaluation is needed to find out which aspects need to be improved.

A pie chart depicting the distribution of student grades shows a clear proportion of the results of the evaluation. As an illustration, the proportion of students with grades A, B, and C will be clearly visible on the pie chart, which provides easy-to-understand visual information regarding the comparison between groups of students who have excellent, good, and sufficient learning outcomes.

The distribution of student scores in the first cycle shows variations in students' understanding of the material. Although a third of students managed to obtain an A grade, almost half were still in the C grade category, indicating a need for improvement in the learning process. Therefore, in the next cycle, adjustments to learning strategies and a more personalized approach are needed to improve the understanding of students who are still in

the C and B grade categories. The results of the second cycle showed significant changes in the distribution of student grades as follows:



Grades (86.7%) in the second cycle, as many as 86.7% or 26 students obtained A grades. This shows a very significant improvement compared to the first cycle, where only 33.3% of students obtained A grades. This increase reflects the effectiveness of the learning strategies applied in the second cycle, which most likely have helped students understand the material better and master the concepts taught.

A B grade (10.0%) of 10.0% or 3 students obtained a B grade in the second cycle. Although the number decreased compared to the first cycle (23.3%), this percentage shows that a small percentage of students still experience difficulties in some aspects of the material. This B may indicate that despite improvements, there is still room for further improvement, especially for students in this category.

A C grade (3.3%) was only 3.3% or 1 student obtained a C grade in the second cycle, which was a drastic decrease from 43.3% in the first cycle. This shows that the majority of students have managed to improve their understanding and achieve a better level of understanding. A significant decrease in the number of students who obtained a grade of C indicates the effectiveness of the applied learning.

The pie chart depicting the distribution of student grades in the second cycle shows a clear proportion of students with A, B, and C grades.

The results of the first and second cycles showed a very significant increase in the achievement of student learning outcomes. The increase in the number of students who obtained A grades, as well as the drastic decrease in the number of students who obtained C grades, showed that the learning approach applied in the second cycle was successful. Nonetheless, there are still some students who earn B's, which indicates that continuous improvement efforts need to be made to ensure all students can achieve optimal results.

CATEGORY	CYCLE 1 (30 STUDENTS)	CYCLE 2 (30 STUDENTS)
A (Value: 30)	14	27
B (Value: 20)	7	3
C (Value: 10)	9	1
Grade point average	21	28

In this study, actions were taken to improve student learning outcomes through two cycles. The first cycle involved 30 students, with an average score of 21. This score shows that in the early stages, there are still many students who have not reached optimal understanding. However, in the second cycle, after improvements and the application of more effective methods, the average student score increased significantly to 28. This improvement shows that the strategies applied in the second cycle have successfully had a positive impact on improving students' understanding and learning performance

Overall, the comparison of average scores between the first and second cycles shows significant progress, which can be interpreted that the change in the IBL teaching method or approach applied in the second cycle has succeeded in improving the overall learning outcomes of students.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that the application of the inquiry-based Learning (IBL) model has a significant impact on increasing Darun Nasya Junior High School students' understanding of static electricity materials. This learning model allows students to be more active and involved in the learning process through experiments, discussions, or independent information searches. Thus, students not only receive material passively but are also directly involved in the process of concept discovery, which in turn deepens their understanding of physics concepts.

The Inquiry-Based Learning model emphasizes students' ability to ask questions, investigate, and find answers to questions that arise during the learning process. This

approach not only helps students understand the material more deeply but also develops critical thinking and analytical skills that are indispensable in the study of science.

Therefore, the use of the Inquiry-Based Learning model is highly recommended for physics learning at various levels of education, especially in abstract materials such as static electricity. With this model, it is hoped that students can better understand and appreciate physics concepts and be able to apply this knowledge in real situations. Furthermore, the IBL approach can also increase students' motivation to learn and make the learning process more interesting and enjoyable.

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