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ANALYSIS OF STUDENT'S LEARNING DIFFICULTIES IN THE IMPLEMENTATION OF SCIENCE PRACTICUM AT SMP NEGERI 2 MARBAU

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ABSTRACT

This study aims to analyze the learning difficulties of eighth grade students of SMP Negeri 2 Marbau in implementing science practice. The learning difficulties studied include four main indicators, namely infrastructure, the process of implementing the practice, technical obstacles, and mastery of theory. The research method used is descriptive qualitative with a total sampling technique of 167 students as respondents. Data were obtained through questionnaires, interviews, and documentation, then analyzed using a percentage approach. The results showed that the highest difficulties lie in the infrastructure aspect with a very high category (82.25%), the process of implementing the practice (78.8%) and technical obstacles (75.5%) and mastery of theory is classified as low difficulty level (36.6%), the result is an imbalance between conceptual understanding and students' practical skills. These findings indicate the need for improvements in the provision of laboratory facilities, science process skills training, and the design of more authentic practical activities to improve students' overall scientific competence.

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1. INTRODUCTION

Abd Rahman, 2022, Say education is an important part that every human being must have. Through education, humans are trained to use their reason and thoughts well [1]. Education is also a key milestone in producing quality human resources. According to Ni'am & Arafah, 2024, Education has clear and sequential levels, starting with elementary school and continuing through secondary and higher education [2]. Damayanti & Dikka, 2022. Say the progress of a nation is based on the success and quality of its educators, but there are efforts to improve the success and quality of education [3]. However, at various levels of education, there are definitely some who experience learning difficulties at each level and these learning difficulties are felt by each one of them in science learning Yunarti, 2021 say. [4].

According to Mendrofa & Lase, 2023, [5] Natural Sciences (IPA) is the study of phenomena occurring in nature, both living and non-living, as a science subject. It is not merely the acquisition of a body of knowledge in the form of facts, but rather a process of discovery. This is say it Gea & Zega, 2023, science learning provides students with hands-on experience, enhancing their ability to absorb, retain, and apply the concepts they have learned [6]. Students' inability to comprehend the material will inevitably lead to misunderstandings. Inadequate mastery of science concepts will result in low grades in science subjects. This can be caused by students' difficulty responding to the lessons their teachers provide Prayunisa & Marzuki say, 2024 [7]. Alifah et al, 2022, say therefore, students are expected to gain a deeper understanding of the natural environment by focusing on discovery and creation, one way of which is by

carrying out science practicals [8].

According to Doloksaribu & Suaka, 2021, science practicum is an activity carried out to discover a new concept or principle for students which is based on existing concepts or principles [9]. The aim of carrying out practical activities is to prove a theory in learning and the possibility of learning difficulties experienced by students at school Rabiudin et al, 2022 say [10]. Amaliyah, et al, 2021, learning difficulties are a condition where students cannot learn normally, due to threats, obstacles or disturbances in learning [11]. Aptriyana, et al, 2021 [12] He added that learning disabilities are disorders experienced by children related to internal and external factors that cause these disorders to have difficulty in analyzing the information received during learning. Appropriate learning methods and motivation also greatly determine academic achievement. However, if learning motivation is lacking or absent, it is likely to result in students' academic achievement not being achieved Winata, 2021 say [13].

SMP Negeri 2 Marbau is one of the schools participating in science practicum activities. However, based on initial observations obtained from interviews with teachers, many eighth-grade students experience difficulties in implementing science practicum activities. These difficulties are evident from a lack of understanding of basic science concepts, incomplete laboratory equipment and materials, difficulties in operating experimental equipment and materials, and a lack of skills in analyzing and interpreting practicum data. Therefore, it is important to conduct an in-depth analysis of the factors that cause learning difficulties for students at SMP Negeri 2 Marbau in the context of science practicum activities. This is reinforced by research conducted by Nurrahmah et al, 2021, which explains the Analysis of Practical Obstacles in High Schools [14].

This study aims to analyze the difficulties experienced by eighth-grade students of SMP Negeri 2 Marbau in science practicum activities. The aim is to identify the main causes of these learning difficulties and provide recommendations for solutions that can help improve learning effectiveness. Therefore, the results of this study can serve as a basis for developing more effective learning methods and supporting student success in understanding science material.

2. RESEARCH METHOD

This study was a qualitative study with a sample size of 167 students, using a total sampling technique. In this study, the researchers sought to analyze students' learning difficulties during the eighth-grade science practicum at SMP Negeri 2 Marbau. This study was conducted at SMP Negeri 2 Marbau, in Pulau Bergot Village, Marbau District, North Labuhanbatu Regency, North Sumatra Province.

The population of this study was all eighth-grade students of SMP Negeri 2 Marbau, while the sample was all students in grades VIII-1 to VIII-6 of SMP Negeri 2 Marbau, using a total sampling technique of 167 students.

The procedure used in this study was divided into three stages:

a. Preparation Stage
   1. Observing the school that would be used as the research location.
   2. Creating a learning difficulties instrument outline.
   3. Creating a research instrument in the form of a learning difficulties questionnaire in the science practicum.
   4. interviews are conducted in order to be able to carry out validating the questionnaire with an expert validator.

b. Implementation Stage

   During the implementation stage, researchers went directly to the field, specifically the research site. The implementation stages were as follows:
   1. Taking research samples from existing classes.
   2. Administering a questionnaire on learning difficulties during the science practicum.

c. Reporting Stage

   Analyzing and processing research data, and reporting the results. To measure student learning difficulties during the science practicum, a 35-question questionnaire was used, with a Likert scale of 4 (strongly agree), 3 (agree), 2 (disagree), and 1 (strongly disagree).

The data were analyzed using questionnaires, interviews, and documentation. The data were analyzed using descriptive analysis. The questionnaire results were analyzed by finding the average student questionnaire score and the total score achieved for each questionnaire indicator using the Learning

Difficulties Questionnaire formula:

$$P = \frac{F}{N} x\ 100\%$$

Where:

P = Percentage of student responses

F = Frequency of students answering a choice

N = Number of samples

100 = Fixed number

Determination of student learning difficulty categories was carried out per sub-variable using the following reference:

Table: 1. Categories of Student Learning Difficulties

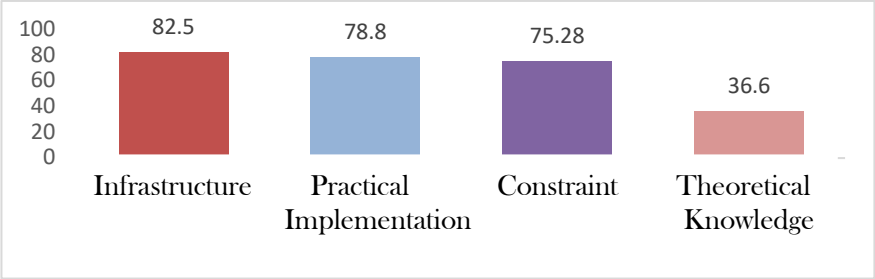
Percentage	Category
81,26% < skor < 100%	Very high learning difficulties
62,51 % < skor < 81,25%	High learning difficulti
43,76% < skor < 62,50%	Moderate learning
25% < skor < 43,75%	Low learning difficulties

3. RESULT AND ANALYSIS

Result

The results of the study on learning difficulties in implementing science practicums can be seen in the indicators that can be the cause of students' learning difficulties, the results obtained are as follows:

Figure 1 Questionnaire Results for Each Indicator



The diagram above shows the results of the questionnaire for each indicator of learning difficulties assessment in the implementation of science practicums, which can be seen in the following description: (1) The infrastructure indicator obtained 82.25% (very high); (2) The practical implementation process indicator obtained 78.8% (high); (3) The constraints indicator obtained 75.5% (high); (4) The theoretical knowledge indicator obtained 36.6% (low).

Learning difficulties in science labs can negatively impact students' conceptual understanding, science process skills, and motivation. This can lead to decreased academic achievement, a lack of interest in science, and difficulties in developing critical thinking and problem-solving skills.

Analysis

Based on the research results, the analysis of student learning difficulties can be described as follows :

Infrastructure

The level of difficulty in infrastructure reached 82.25% (very high), making it the most crucial issue in implementing science practicums. Interviews with teachers revealed that basic equipment such as microscopes, measuring cylinders, and test tubes were not readily available at the school. Furthermore, consumables such as chemical reagents and pH indicators had not been restocked in recent years.

M. Masruri, 2020, stated that this situation forces practical activities to be conducted in regular classrooms, rather than in proper laboratories. As a result, the essence of laboratory learning is lost, as classrooms are unable to provide a controlled environment, standard safety procedures, and the authentic

scientific atmosphere that characterize laboratory activities [15]. Furthermore, T.J. Hartanto, et al., 2023, stated, The impact of this limitation is very significant on the student learning process. Students never experience direct experience (hands-on experience) in using scientific tools and materials. This causes them to fail to build a comprehensive understanding of science as an empirical and experimental-based science. The impact of this limitation is very significant on the student learning process. Students never experience direct experience (hands-on experience) in using scientific tools and materials. This causes them to fail to build a comprehensive understanding of science as an empirical and experimental-based science. [16]. Thus, limited facilities and infrastructure not only hinder the technical implementation of practicals, but also disrupt the fundamental formation of students' scientific character.

Practical Implementation Process

The difficulty level in the practical implementation process reached 78.80% (high). This difficulty was primarily caused by the inauthentic design of the practical activities and their inconsistency with the principles of laboratory-based learning. One of the main causes was the relocation of the practical from the laboratory to a regular classroom, which directly impacted the quality of the students' learning experience.

At least three main problems arose from this situation: (1) Unsupportive spatial layout, as classrooms with fixed seating arrangements hampered student and teacher mobility and made demonstrations of the use of practical equipment difficult. Activities that should have been exploratory became physically and visually limited; (2) Time duration was very limited, with the average time allocated for practicals being only about 30 minutes per session, leaving students insufficient time to conduct independent experiments, let alone repeat experiments or make further observations; (3) Minimal teacher intervention and guidance, with a high teacher-to-student ratio (1:35), made it difficult for teachers to provide optimal individual guidance during practicals. As a result, many students simply followed procedures without understanding the scientific context A.M.I. Sakti dan F. Kadir, 2022 say [17].

These conditions cause practicums to lose their meaning as scientific processes and become mere procedural rituals. Students simply follow the steps demonstrated by the teacher, without understanding the purpose, the working principles of the equipment, or the meaning of the data obtained Y. Ernita dan D.S. Nindiati, 2024 say about that condition [18]. For example, in a food testing lab using litmus paper, students only note the color change without understanding that the change is the result of ionic interactions between food compounds and the pH indicator, which indicates the acidic or basic nature of the sample.[19]

In other words, instead of strengthening scientific thinking skills, practicums that are not designed authentically actually strengthen mechanistic and rote learning patterns, which are contrary to the goal of science learning as a process of exploration and proof.

Obstacles

According to A. Riyanto, S. Susanti, and Bramastia in 2023, the difficulty level in the constraints aspect reached 75.28% (high). Two main problems were most frequently encountered in the field: (1) Difficulty in operating laboratory equipment; many students were unable to read the scales of simple measuring instruments such as thermometers or analog scales. These errors included inaccuracy in reading scales, not understanding units, or not knowing how to adjust their viewing position to avoid paracal error; (2) Inability to analyze experimental data; after conducting an experiment, students were often unable to connect their observations with the theory they had learned. They simply recorded the data they saw without interpreting it or drawing logical scientific conclusions. In other words, instead of strengthening scientific thinking skills, inauthentic laboratory work reinforces mechanistic and rote learning patterns, which contradict the goal of science learning as a process of exploration and proof.[20]

The root of both of these problems for students is a lack of training in science process skills. Research at SMP Negeri 2 Marbau found that students were rarely given explicit instruction in basic laboratory techniques, such as instrument calibration and systematic data recording. Students' lab reports were assessed solely on the completeness of procedures and writing format, not on the depth of analysis, accuracy of interpretation, or scientific reflection on the experimental process [21]. As a result, students are not encouraged to develop critical and analytical thinking skills in science.

Thus, the obstacles that arise during practical activities are not solely caused by technical factors such as equipment damage or limited laboratory facilities. Furthermore, these obstacles also reflect

deficiencies in the process of developing students' skills, particularly in the use of laboratory equipment, observation, data recording, and drawing scientific conclusions [22]. Lack of guidance from teachers is also one of the obstacles preventing students from developing complete scientific competencies, which include scientific knowledge, skills, and attitudes that should be formed through direct experience in carrying out practical activities.

Theoretical Knowledge

Students' difficulty level in understanding science theory reached 38.6% (low). This figure indicates that theoretical learning in class is considered successful. This success is due to the dominance of lectures and theoretical discussions, which account for approximately 80% of the learning time [23]. Teachers focus more on verbally delivering material, practicing problems, and repeating basic concepts. As a result, many students are able to memorize science terms and even answer multiple-choice questions effectively.

However, this success actually creates a new hidden problem, namely the gap between theoretical understanding and practical skills. On the one hand, students appear to be able to master the concept verbally, but on the other hand they are unable to apply or prove the concept in an experimental context. As that many students can explain the process of photosynthesis theoretically, but do not know how to observe the color change in the iodine test to detect starch in leaves, because practical tools and materials such as beakers, spirits, and reagents are not available in the laboratory. [24]This situation contains a truth or uniqueness that needs to be understood: students are judged to understand science, when in fact they only know its abstract side. The essence of science as a science based on experimentation and empirical verification is lost. Furthermore, this has the potential to foster misconceptions among students that science is a rote subject and irrelevant to real life, when in fact, the essence of science is the process of seeking truth through direct observation, experimentation, and data analysis. [25]

4. CONCLUSION

The research results indicate that eighth-grade students at SMP Negeri 2 Marbau have significant learning difficulties and continue to experience various complex and interrelated barriers, significantly impacting the effectiveness of science learning. The primary challenge lies in the lack of adequate laboratory facilities and infrastructure, such as the unavailability of basic equipment and consumables needed for experiments. This prevents practical activities from being carried out properly and requires them to be conducted in regular classrooms, ultimately reducing the quality of students' hands-on learning experiences. Furthermore, the practical implementation process is also suboptimal due to limited time, space, and teacher guidance, leading students to tend to follow procedures without understanding the scientific context. Another significant obstacle is students' poor skills in operating equipment and analyzing experimental results, indicating a lack of development in comprehensive science process skills.

Although students' theoretical understanding is quite good, this is not accompanied by adequate practical skills, creating a gap between conceptual mastery and its application in the field. Students appear capable of answering theoretical questions, but struggle when asked to prove or observe concepts through real-world experiments. This situation demonstrates that the dominant learning approach still relies on memorization and fails to address the essence of science as a discipline based on observation, exploration, and empirical evidence. Therefore, comprehensive improvements are needed in terms of facility provision, practical skills training, and the design of learning activities that balance theory and practice to optimally develop students' scientific competencies. Some ways to overcome learning difficulties in science practicums are by creating a pleasant learning atmosphere, actively involving students in the learning process, using a variety of learning methods, providing personal support and assistance, and giving students enough time to understand instructions and complete assignments.

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