



Science Laboratory: A Student's Perception of Practicum Implementation at Junior High School

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ABSTRACT

The importance of practical implementation, especially in science subjects, is challenging for educators, students, and schools. Many findings are related to various obstacles and problems regarding implementing practicum in the laboratory, so the implementation is considered ineffective. This research aims to determine students' perceptions of implementing practicum in the science laboratory. This study used a survey method with a quantitative approach involving 96 respondents, consisting of 48 students in 8th grade at Junior High School 1 Kuantan Hilir and 48 students in 8th grade at Islamic Junior High School 1 Sentajo Raya. The instrument used was a questionnaire consisting of 26 statement items. The data collection technique was done by distributing questionnaires directly and then conducting descriptive analysis. The results of this study indicate that students' perceptions of the practical implementation in the science laboratory are in a good category (72.50%). In general, the practical implementation in the science laboratory for grade 8 students at Junior High School 1 Kuantan Hilir and Islamic Junior High School 1 Sentajo Raya has been carried out well. It can be concluded that students have a good perception of the implementation of practicum in the science laboratory.

INTRODUCTION

Science is one of the areas of learning taught in basic education worldwide. This subject introduces students to the concepts of biology, chemistry, physics, and earth science (Sabanal et al., 2023). The essence of science education is to involve students in scientific investigations (Safaah et al., 2017). Scientific research includes including formulating problems, generating hypotheses, designing experiments, collecting data, analyzing data, and drawing conclusions (Pertiwi, 2019). Science process skills are a basic skill that is very important in scientific investigations (Darmaji et al., 2019; Kramer et al., 2018; Zulirfan et al., 2018). Science process skills play a crucial role in providing students with meaningful learning experiences and aiding them in developing higher-order thinking skills (Tilakaratne & Ekanayake, 2017). So, in learning science, science process skills are very important because science learning is integrated from physics, biology, and chemistry, which contain many abstract concepts (Hadiprayitno et al., 2019). So, science process skills are needed to understand science learning well.

Doing practicum activities can help develop students' science process skills. Practical activities are fundamental as they have the potential to stimulate motivation for learning science and cultivate fundamental skills in conducting experiments (Sari et al., 2023). Practicum aims to allow students to prove a theory in practice and relate it to everyday life (Endela et al., 2019). Practicum activities can provide a direct experience of the phenomenon of learning science, which cannot be obtained if students only learn from textbooks in class (Mellish et al., 2019; Ramadhan & Suyanto, 2020). Practicum activities significantly influence science learning and student learning motivation (Gya & Bjune, 2021). A practicum is a vehicle for developing basic skills in conducting experiments and scientific investigations (Najemah, 2020).

Practical activities and scientific investigations are carried out in the laboratory (Nulngafan & Khoiri, 2021). A laboratory serves as a facility for conducting practical activities, observations, experiments, and research in which there is a collection of tools and other facilities related to implementing practical activities (Maulina et al., 2019; Pertiwi, 2019). The laboratory will only function properly if it has facilities and infrastructure according to the standards set out in Permendiknas No. 24 of 2007 (Rahman, 2017). One of the obstacles to implementing practicum in schools is inadequate facilities and infrastructure. Thus, good and effective laboratory management is needed from all parties in the school. Science laboratory management includes efforts to manage laboratory facilities as well as all practicum activities carried out in the laboratory (Pertiwi, 2019). Laboratory management comprises planning, organizing, implementing, and evaluating (Nahdiyaturrehman et al., 2020; Pertiwi, 2019).

Implementation aspects in laboratory management must be connected to good planning; therefore, the teacher should focus on planning practicum activities so students can learn optimally (Ramadhan & Suyanto, 2020). Increasing students' understanding of science concepts, direct experience to prove a theory, training students' science process skills, and increasing motivation to learn science are potential outcomes of implementing practicums in the science laboratory. Practicum implementation comprises three stages: the preliminary stage (preparation), the implementation stage, and the closing stage (Endela et al., 2019; Yuliana et al., 2017). However, science practicum activities in schools still need to be carried out due to several aspects, both in terms of facilities and infrastructure, time, and constraints on teacher abilities. There are still many problems that still need to be solved in the implementation of science practicum so far (Simamora, 2018).

Carrying out practicums takes longer, so the time for practicums must be arranged as much as possible. One of the obstacles that prevents schools from carrying out practicums is time constraints (Endela et al., 2019). In addition, obstacles to the non-implementation of science practicum activities in schools include practicum rooms being used as classrooms for regular study, the intensity of teachers who have participated in laboratory training is still tiny, facilities and infrastructure which include tools, materials and practicum facilities are still minimal, material demands a lot of science learning, so teachers teach using the lecture method, there is still a lack of understanding of science teachers in using laboratory equipment, and there is no laboratory assistant who is in charge of helping science practicum activities in the laboratory (Marcella et al., 2018; Simamora, 2018).

Implementation of practical activities is closely related to students. The objects observed in the practicum are captured directly by the students' five senses so that students can translate the things observed. Therefore, student perception is essential in implementing science practicum in schools (Endela et al., 2019). Student perceptions can be interpreted as student responses about a phenomenon or object observed through the five senses; then, students can analyze the phenomenon or object (Yuliana et al., 2017). Student perception is related to how students feel, assess, understand, and can apply it in life. So far, students' perceptions have yet to pay much attention to the implementation of science practicum in the laboratory, so it isn't easy for the teacher to improve the quality of practicum implementation (Maarif, 2016). As the main executors of practicum activities, students must have their perceptions of their feelings. Thus, it is essential to analyze student perceptions.

Several relevant study results regarding the implementation of science practicums only discuss the science laboratory management system seen from the perspective of planning, implementation, and evaluation (Nahdiyaturrehman et al., 2020; Najemah, 2020; Nugroho et al., 2022; Nulngafan & Khoiri, 2021). Meanwhile, student perceptions were not the center of attention in previous relevant studies. It is essential to study student perceptions to analyze students' points of view directly to

improve the implementation of practical activities in the future and make them better. Therefore, this research explores students' perceptions of implementing practicums in junior high school science laboratories, especially Junior High School in Kuantan Singingi Regency, Riau.

RESEARCH METHODS

Research Approach

The method used in this research is a survey with a descriptive quantitative approach that aims to describe students' perceptions of the implementation of practical work in the science laboratory in the form of meaningful numbers (Nugroho et al., 2022). The survey method collects information from groups that represent a population. Quantitative data is obtained by calculating the questionnaire score based on the student's answers.

Research Participants

The study population was all 8th grade Junior High School 1 Kuantan Hilir students and Islamic Junior High School 1 Sentajo Raya. The research sample was obtained using a saturated sampling technique, totaling 96 students: 48 8th grade of Junior High School 1 Kuantan Hilir and 48 8th grade of Islamic Junior High School 1 Sentajo Raya.

Research Instruments

The data collection instrument was a questionnaire adapted from Maarif (2016). This questionnaire was prepared using a Likert scale consisting of 26 statement items. Indicators of students' perceptions of implementing practicum in the science laboratory can be seen in Table 1.

Table 1. Indicators of students' perceptions of the implementation of practicum in the science laboratory

No	Aspect	Indicator
1	Students' perceptions of practicum preparation	Understanding of the material and practicum objectives Preparation before entering the laboratory room Preparation of place, equipment, and practical materials Explanation of work steps and use of practical equipment
2	Students' perceptions of practicum implementation	Implementation of practical work steps Pay attention to security, safety, and laboratory regulations Have a practical worksheet
3	Students' perceptions of practicum closure	Clean, restore, and organize the place/equipment/practical materials Re-check before leaving the laboratory

Adaptation Maarif (2016)

Data Collection

The data collection technique was done by distributing questionnaires directly and then conducting descriptive analysis. A questionnaire analysis aims to determine the percentage of student's perceptions of the practical implementation in science laboratories, especially Junior High School in Kuantan Singingi Regency, Riau.

Data Analysis

The data that has been obtained is then processed quantitatively by calculating the score of the questionnaire answers, which are then given a description. The percentage of student perceptions can be calculated using the following formula Sudijono (2008).

$$P = \frac{f}{n} \times 100\%$$

P is the percentage of perceptions sought, f is the frequency of questionnaire answers, and n is the number of samples. The percentage calculation results can be seen based on the criteria in Table 2.

Table 2. Criteria for the percentage of student's perceptions of the implementation of practicum in the science laboratory

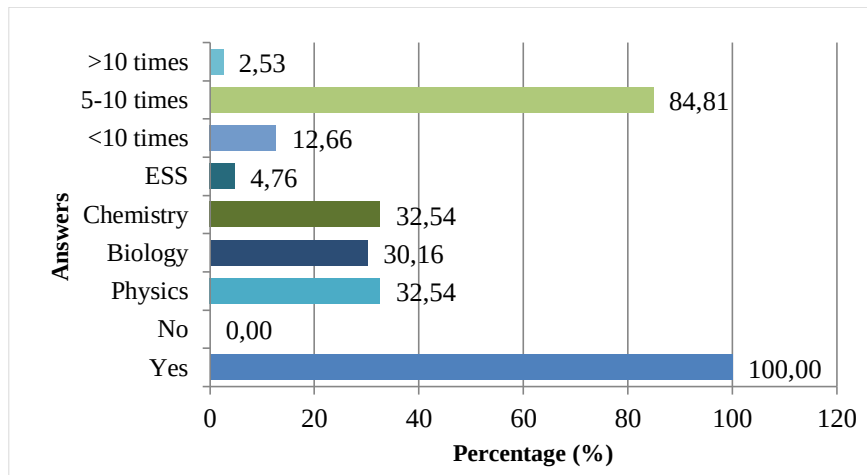
Percentage of Student Perceptions (%)	Indicator
86-100	Very Good
71-85	Good
56-70	Enough
41-55	Low
25-40	Not Good

Adaptation Riduwan (2010)

RESULTS AND DISCUSSION

Results

Practical implementation in the laboratory can undoubtedly positively impact science learning; students can observe objects directly and create a better learning experience. It is necessary to know students' perceptions regarding practicum in science laboratories in schools to see whether practicum activities have been carried out correctly. The results of the research done by distributing questionnaires consisting of 9 indicators and 26 statement items can be seen in Figure 1 and Table 3.

**Figure 1.** Percentage of answers to the initial question questionnaire**Table 3.** Results of data analysis for each indicator

No	Indicator	Average (%)	Category
1	Understanding of the material and practicum objectives	76.43	Good
2	Preparation before entering the laboratory room	73.61	Good
3	Preparation of place, equipment, and practical materials	66.67	Enough
4	Explanation of work steps and use of practicum equipment	80.34	Good
5	Implementation of practical work steps	76.48	Good
6	Pay attention to security, safety, and laboratory rules	73.78	Good
7	Has a practical worksheet	70.14	Enough
8	Clean, restore, and organize the place/equipment/practical materials	66.60	Enough
9	Re-check before leaving the laboratory	68.49	Enough
Average		72.50	Good

Before answering statements about students' perceptions of implementing practicum in the science laboratory, students were asked to answer the initial question first to see how often practicum is carried out in the school.

Discussion

Based on Figure 1, in the first question, the result was that all students stated that practicum activities were carried out every semester. Practical activities are carried out every semester, but only on certain materials; this is due to considering practicum materials that work and using tools and materials that are readily available. During one academic year, the teacher carries out at least one practicum (Prastika et al., 2017; Wirayuda et al., 2022). The research results by Adilah et al. (2021) revealed that practicums are carried out at least once a semester. Time limitations and inadequate laboratory facilities are some of the reasons why practical activities are not carried out. Some material was not implemented in the practicum because there was not enough time to carry out the practicum.

Then, on the second question regarding which practicums were carried out, as many as 32.54% answered Physics, and Chemistry obtained the same results of 32.54%. Meanwhile, for Biology, the result was 30.16%, and for ESS, it was 4.76%. According to Sukarjita (2020), science practicum at the junior high school education unit level includes physics and biology practicum. Material analysis related to practicum activities based on the research results of Prastika et al. (2017) showed that science biology material is most often taught through practical activities, for example, observing cells using a microscope, making *tapai/tempeh*, and growing sprouts. Common physics science practicums are quantities, units, measurements, electric charges, and series-parallel circuits. Meanwhile, the most widely used chemical science practicum is observing changes in chemical reactions, acid-base testing with litmus paper, and differentiating between colloidal solutions and suspensions. It is rare to find an ESS practicum due to the absence of supporting tools and materials to carry it out.

Furthermore, regarding the frequency of practicum activities in 1 semester, the highest percentage is 5-10 times (84.81%), <10 times (12.66%) and >10 times (2.53%). Most teachers consider this practicum activity necessary in the science learning process, as evidenced by implementing practicum at least once in one academic year. The frequency of such practicum activities is due to some difficulties in optimizing practicum activities in schools that still need to be improved by teachers (Prastika et al., 2017). In line with the research of Anggereni et al. (2021), the frequency of practicum implementation needs to be considered sufficient. This is due to the unavailability of practicum teaching materials and the limited material tools needed during practicum.

The results of the perceptions of 8th-grade students at Junior High School Kuantan Singingi regarding implementing practicums in the science laboratory based on Table 4 were analyzed according to the aspects studied. From the practicum preparation aspect, indicators of understanding the material and practicum objectives obtained a good category (76.43%) because educators carefully prepared the learning during this preparation stage. Before the practicum, the teacher conveys the purposes of the practicum so that students know the goals they must achieve (Ningrum et al., 2019). Delivering practicum objectives is necessary so that students can achieve their learning targets. The preparation stage needs to be carried out to minimize the possibility of failure or weaknesses that may arise (Ali, 2017; Antarini et al., 2020).

The preparation indicator before entering the laboratory room was obtained in a good category with a value of 73.61%. This shows that students have followed the rules that apply in the laboratory. The rules for using the science laboratory, according to Amini (2020), include that students are prohibited from bringing objects or items that have nothing to do with carrying out practical work into the laboratory, for example, food or drinks, to maintain the cleanliness of the laboratory. This is in line with research by Haryati et al. (2021), which found that students carry out practicum in groups. Before starting the practicum, students should prepare various practicum needs such as lab clothes, masks, gloves, etc. The teacher divides students into small groups heterogeneously; this is intended so that students who understand more can help their group members who need help understanding to achieve learning objectives. The grouping of students was carried out considering the limited tools and materials that made it impossible to carry out individual practicums (Ali, 2017; Ningrum et al., 2019).

Aspects of practicum preparation on indicators of preparation of places, equipment, and practicum materials obtained the sufficient category (66.67%). This shows a need for student participation in helping prepare the equipment needed to carry out the practicum. This is in line with Setyaningsih & Wascita's (2021) research, which shows that students' low preparation before

practicums can be caused because the laboratory conditions when they first enter are clean. The tools used are available on the table to support learning.

The next aspect is the student's perception of the practicum implementation. The indicator of explaining work steps and using practicum equipment is the highest perception, with a value of 80.34%. This indicator is relatively high because, generally, the teacher will give instructions on what must be done before carrying out the practicum. This shows that explaining work steps and explanations for using practicum equipment is easy for students to understand. In line with the study by Maarif (2016), the results of students' perceptions of the explanation of practicum work steps were good. The explanation of work steps and the use of practicum equipment are important indicators that the teacher must prepare so that students can easily understand and learn the work steps before practicum activities begin (Fitriani, 2019).

According to Simamora (2018), to obtain the structure and principles of a natural science phenomenon through experiments, students must go through procedures and work steps to show the actual value of the wonders that students have obtained. If students do not understand the work steps and the use of practicum equipment, then practicum activities will not be carried out optimally as they should. This aligns with the study by Alexander et al. (2018), which states that the stages of practicum work are arranged by a teacher or a group of teaching staff to assist students in completing practicum activities as a facility to provide information.

Furthermore, the indicators for implementing practical work steps received an average of 76.48% in the good category. This result means that the implementation of student practicum work steps went well because previously, students had understood the explanation of work steps and the use of practicum equipment. These results align with the study by Endela *et al.* (2019) that students' perceptions regarding implementing work steps in practicum activities obtained very good results. Students can carry out practicums in sequence if precise practicum guidance tools support them. Practicum guides would be better prepared by paying attention to aspects of higher-order thinking skills so that students can use their thinking abilities to the fullest and their scientific investigations improve (Pertiwi, 2019).

Related to indicators of paying attention to laboratory security, safety, and discipline, a good category is obtained with a value of 73.78%. This shows that paying attention to security, safety, and laboratory rules has been going well. These results align with the study by Endela *et al.* (2019) that the teacher's explanation before carrying out the practicum is well understood by students so that they can anticipate work accidents during the practicum. It is very important to pay attention to work security and safety in the laboratory so that unwanted, dangerous things do not occur. Discipline is needed to establish rules for security and safety at work in the laboratory (Agustina, 2018). The equipment that needs to be provided to handle accidents in the laboratory is a first aid kit and fire extinguisher (Adilah *et al.*, 2021).

The indicator has a worksheet in the sufficient category with a value of 70.14%. The availability of worksheets is very important because they can serve as a guide for implementing practical work for students. Worksheets are an important guide that can help students carry out practicums (R. S. Dewi, 2020). A guide or practicum worksheet can support practicum implementation more effectively and efficiently. If worksheets are available, students will find it easier to carry out practical work because they need help understanding what work steps will be done. Worksheets are created to make it easier for students to carry out practicums well (Anggereni *et al.*, 2021). This is in line with the research of Lubis *et al.* (2019), who stated that the importance of guidebooks is in providing direction regarding the work steps that will be carried out during the practicum. In line with changes in the curriculum, the teacher should prepare worksheets repeatedly to update the teacher's knowledge (Diella *et al.*, 2019).

The practical closing aspect of the indicators of cleaning, returning, and arranging the place/equipment/practicum materials obtained an average of 66.60% in the sufficient category. This shows that students are lazy and prefer to avoid cleaning, returning, or arranging practical places/equipment/materials. According to D. A. K. D. S. Dewi *et al.* (2019), equipment maintenance can be done by arranging and rearranging tools or materials that need to be neater or have incorrect specifications. Practical equipment that has been used must be cleaned by washing it and then

returning it to its original place. According to Trisianawati & Fitria (2020), an arrangement is closely related to grouping, placement, and storage and can make laboratory equipment easier to trace.

Then, the indicator for re-checking before leaving the laboratory was also obtained in the sufficient category with a value of 68.49%. This proves that student discipline must improve when leaving the science laboratory. After the practicum ends, students leave the laboratory immediately without doing an evaluation. According to Maarif (2016), students should re-check everything the teacher has ordered before leaving the science laboratory room. If equipment is found to be damaged or lost, students can record it and then give it to the science subject teacher. This can help laboratory assistants/teachers when re-inventorying the facilities in the science laboratory.

The results of this study indicate that, generally, the implementation of practicum in science laboratories based on student perceptions is good. This means the practical implementation in the science laboratory at Junior High School 1 Kuantan Hilir and Islamic Junior High School 1 Sentajo Raya has been carried out correctly. This can be seen from the perspective of the preparation and implementation of practicum. Meanwhile, the practicum is still of sufficient value in the closing element. Students are happy carrying out practical work but lack the tools to check or return after being used for practicum. Students prefer to leave the laboratory immediately after the practicum is finished without checking first, even though this is the student's responsibility, so equipment damage can be reported to the teacher.

In general, students feel happy with practicum activities because, through carrying out practicums, students can gain many exciting things. Science subjects are closely related to everyday life; students stated that with practicum, science material becomes easier to understand because students can directly apply what they have learned (Andika *et al.*, 2021; K.W *et al.*, 2020). Even so, in closing activities such as returning tools, it was found that some did not return them to their original places. Students often need to check whether the equipment that has been used is complete and in good condition. Students are hurrying to leave the laboratory, so they must be more careful in checking and storing the tools used (Nurwahidah & Sari, 2022).

CONCLUSION

Based on the results of the discussion related to student's perceptions of the implementation of practicum in the science laboratory, it was concluded that 8th-grade students of Junior High School 1 Kuantan Hilir and Islamic Junior High School 1 Sentajo Raya had a good perception, with a percentage of 72.50%. The implementation of practicum in the science laboratory at the two schools has been carried out well in terms of the preparation and implementation of the practicum. However, several indicators are still in the sufficient category, especially in the closing aspect of the practicum, namely indicators of preparation of practicum places, equipment, and materials, having worksheets, cleaning, returning, arranging practicum places/equipment/materials, and re-checking before leaving the laboratory, for future researchers to be able to expand studies related to this perception so that a more in-depth analysis can be carried out to improve the implementation of science laboratories that are not sufficient.

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