QUANTUM: Jurnal Inovasi Pendidikan Sains, Vol. 17, No. 1, 11-21
p-ISSN: 2086-7328 e-ISSN: 2550-0716
Website:https://ppjp.ulm.ac.id/journal/index.php/quantum/index
DOI:http://dx.doi.org/10.20527/quantum.v17i1.23145

LEVEL OF IMPLEMENTATION OF PRACTICAL ACTIVITIES IN SCIENCE LABORATORIES OF JUNIOR HIGH SCHOOL

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Abstract. Practical work is an essential part of science learning because it provides students with hands-on experience to deeply understand concepts. To determine its effectiveness, a case study was conducted at SMPN 3 Siak Hulu with 60 students through questionnaires and observations. The results showed a significant gap: students' perceptions of practical work were in the "very good" category with an average score of 89.9%. However, observations indicated that hands-on laboratory practice was rarely conducted and was often replaced by teacher demonstrations. This gap is caused by various obstacles such as teacher competencies that do not match their scientific background, limited facilities, and suboptimal time management. Therefore, further research needs to focus on developing solutions such as teacher training programs, measuring the quantitative impact of minimal practical work on students' scientific skills, and expanding the study to a larger scale to validate whether this phenomenon occurs generally.

Keywords: activities, student perception, science experiments, science laboratory,

INTRODUCTION

Human efforts to understand the phenomena of the universe through a process of directed and systematic observation, using scientific procedures and logical reasoning to produce conclusions that can be accounted for. According to Sakila (2023), natural sciences (IPA) is a branch of science that focuses on the study of living things and their various life processes. This science is also known as "natural science" because it studies various phenomena and secrets of nature, including the origin of the universe and its contents, as well as studying the processes, mechanisms, properties of objects, and events that occur in the universe (Kartikasari et al., 2021). Through the universe, this knowledge is obtained, which then becomes the basis for the development of natural science (Arrahma, et al., 2023). The inquiry process forms a body of continuous IPA knowledge and is driven by people in the field of science.

Permendikbud Number 65 of 2013 concerning the standards for elementary and secondary education processes stipulates that the learning process must comprehensively develop the realm of knowledge, skills, and attitudes through a scientific approach. In addition, the learning process is also strengthened by the application of discovery-based or research methods, as well as learning that encourages students to produce work through problem-solving. According to Neli (2024) Natural Science (*Ilmu Pengetahuan Alam*/ IPA) lessons are a field of science that is dynamic and continues to develop along with the progress of science and technology. Every new discovery encourages the need for conducting experiments, because, in essence, students studying science materials are expected to be able to make direct observations of the objects being studied, either using the senses directly or with the help of tools.

Published by: Program Studi Pendidikan Kimia FKIP Universitas Lambung Mangkurat
How to Cite: Yusra, a., Taqwilawaty, I., Kamila, Y., Rahmad, M. & Linda, R. (2026). Students' Perception Towards The Implementation of Practicum in Junior High School. *QUANTUM: Jurnal Inovasi Pendidikan Sains, 17*(1), 11–21. http://dx.doi.org/10.20527/quantum.v17i1.23145.

Article History:
Received : 07-07-2025, *Accepted* : 14-02-2026, *Published* : 30-04-2026

Science laboratories play a crucial role in supporting science learning in schools, allowing students to conduct experiments, observe natural phenomena, and understand concepts more deeply (Gustini & Wulandari, 2020). According to Arsyad (2019), laboratory-based learning can develop critical thinking skills, problem-solving, and scientific skills that cannot be obtained through conventional learning methods. In addition, research by Wiyono (2021) shows that optimal use of laboratories can increase students' learning motivation and strengthen conceptual understanding through direct experience.

However, in practice, laboratory management in schools still faces various obstacles that hinder its effective use. At SMP Negeri 3 Siak Hulu, the science laboratory experiences several major problems, one of which is that it is often used for other activities, such as additional classrooms or meetings, thus reducing the opportunities for students and teachers to carry out practicums, which should be an integral part of science learning. In addition, the absence of laboratory assistants is a major challenge in laboratory management, because teachers have to prepare their own practicum tools and materials, which can reduce the effectiveness of its implementation (Sudjana, 2020). This problem is further exacerbated by the absence of a structured practicum schedule because there is no planning made by science teachers so that practicums are carried out incidentally without clear planning.

The limited skills of teachers in operating laboratory equipment are also an obstacle in the utilization of the laboratory. For example, teachers with a biology background often have difficulty in using physics lab kits, and vice versa. This hinders the implementation of experiments that should help students understand concepts more broadly through an interdisciplinary approach. However, the science laboratory at SMP Negeri 3 Siak Hulu has quite complete tools and lab kits. With better management, these facilities can be used more optimally to improve the effectiveness of science learning (Fadlilah et al., 2019). Therefore, it is necessary to conduct an initial analysis of the problems in science laboratory management in order to identify existing obstacles and find the right solutions so that laboratory utilization can be improved.

Based on research conducted by Maarif (2016), in carrying out practical activities in the science laboratory of SMP IT Al Umar Ngargosoka, it is recommended that students carefully record all the equipment and supplies used during the practicum. In addition, students are also advised to recheck the condition and completeness of the equipment before leaving the laboratory to ensure the smoothness and safety of the next practicum process. This is a concern that students are still less careful about the practicum environment. This lack of accuracy is also a reason for the laboratory to maintain the completeness of the equipment and materials in the laboratory (Dinawati, et al., 2022). In line with research by Artawan (2022), integrated science learning includes planning, implementation, and assessment stages. In the implementation process, it is expected to run according to the rules and follow the teacher's or laboratory assistant's instructions in order to carry out good learning activities and proper assessment.

Many previous studies have discussed science laboratories, but most of them tend to focus on general management aspects, teacher competence, or infrastructure standards (Gustini & Wulandari, 2020; Sudjana, 2020). There is still limited literature that explicitly analyzes the actual implementation of practical activities based on students' perceptions and contrasts it with factual conditions in the field. This research is necessary to bridge that gap by investigating whether students' positive perceptions align with the reality of laboratory usage frequency, specifically in the context of SMP Negeri 3 Siak Hulu. This study aims to determine the level of implementation of

science practical activities with the factual conditions of their implementation at SMP Negeri 3 Siak Hulu. By knowing students' perceptions, it is hoped that practical activities can run in a more structured manner, support experiment-based learning, and help students understand science concepts more optimally.

METHOD

The research method applied in this study is a case study. According to Syahrizal & Jailani (2023), case study research is used to identify and study data obtained from research subjects so that relative patterns of occurrence, distribution, and relationships between variables can be found.

The main instrument used in this study was a questionnaire that covered aspects of student perceptions related to preparation for practicum, implementation of practicum, and closing activities of practicum. The questionnaire used in this study was adapted from the research (Rahmayumita et al., 2024; Maarif, 2016). The data obtained from the questionnaire are in the form of inhibiting factors and supported by observations in the laboratory environment. Data collection was carried out by means of documentation studies, questionnaires, and supporting data from the science laboratory of SMP Negeri 3 Siak Hulu. The data source in this study was students of SMP Negeri 3 Siak Hulu. The indicators of the student response questionnaire are as follows.

Table 1. Student response questionnaire grid

Aspect	Statement Number	Number of Statements
Students' perceptions of practical preparation	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	10
Students' perceptions of the implementation of practical work	11, 12, 13, 14, 15, 16, 17, 18, 19	9
Students' perceptions about closing the practicum	20, 21, 22, 23, 24, 25, 26	7

The subjects in this study were students of SMPN 3 Siak Hulu, totaling 60 students. The data analysis technique process used was descriptive data analysis. Descriptive data analysis is a statistical technique used to describe or explain the data collected as it is, without aiming to draw conclusions that can be generalized to broader research subjects (Sugiyono, 2022). The following is a reference for the assessment used as the assessment criteria for the student response questionnaire.

Table 2. Criteria for interpretation of research variable conditions

Category	Score
Strongly agree	5
Agree	4
Quite agree	3
Don't agree	2
Strongly disagree	1

Adaptation Sugiyono (2022)

After assessing the criteria for the results of the student response questionnaire, the numerical scores of the questionnaire were analyzed before being interpreted from the determined scores (Kadir et al., 2020). The following formula is used to process the numerical scores of the student response questionnaire:

$$P = \frac{f}{N} \times 100\% \quad (1)$$

P is the percentage of the questionnaire indicator, f is the frequency of the total answers to the student's questionnaire responses per indicator, and n is the highest number of scores used according to the total sample in the study. Based on the results of the percentage of the questionnaire indicator, the criteria per indicator can be determined based on the table.

Table 3. Criteria for the percentage of student perceptions of the implementation of practical work in junior high school

Percentage of student perception (%)	Indicator
86-100	Very good
71-85	Good
56-70	Pretty good
41-55	Low
25-40	Very Low

Adoption (Rahmayumita et al., 2024)

The systematic flow of this research, starting from problem identification and data collection to data analysis, is visualized in the following flowchart (Figure 1).

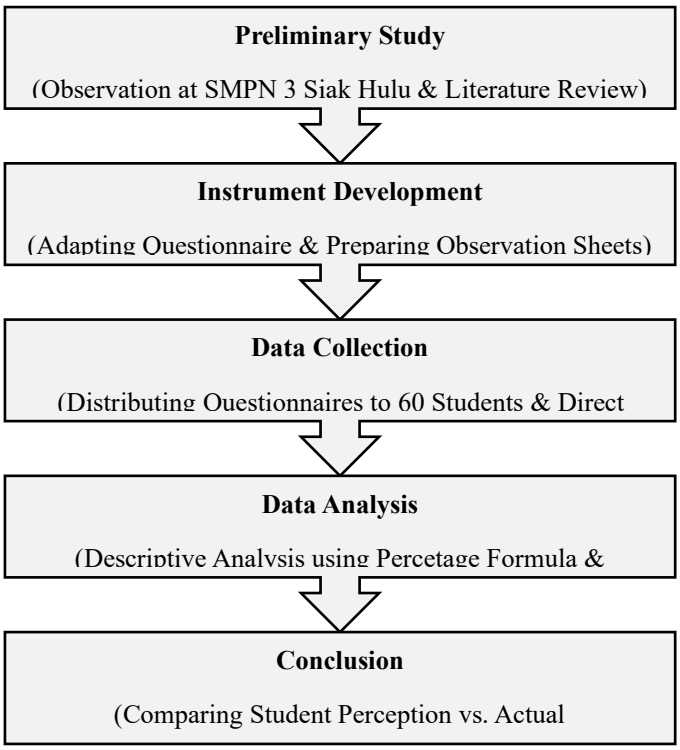

Figure 1. Research procedure flowchart

RESULTS AND DISCUSSION

Practical activities in the science laboratory have been proven to provide a positive contribution to the science learning process, because they allow students to see the objects being studied directly and gain a deeper learning experience. Therefore, it is important to know students' views on the implementation of practical work in school science laboratories as an effort to evaluate whether the activities have been running well and according to objectives. This study was conducted by

distributing questionnaires covering 9 indicators and 26 statements. The data from filling out the questionnaire are shown in Table 4.

Table 4. Results of student perception analysis data on the implementation of practical work at SMPN 3 Siak Hulu

Aspect	Indicator	Percentage (%)	Category
a. Students' perceptions of practical preparation	1.a. Understanding the material and objectives of the practicum	87	Very good
	2.a. Preparation before entering the laboratory room	87	Very good
	3.a. Preparation of place, equipment and materials for practical work	90	Very good
	4.a. Explanation of work steps and use of practical equipment	94.5	Very good
b. Students' perceptions of the implementation of practical work	1.b. Implementation of work steps	92	Very good
	2.b. Pay attention to laboratory safety, security and regulations	91	Very good
	3.b. Have a practical worksheet	88.6	Very good
c. Students' perceptions about closing the practical work	1.c. Cleaning, tidying and arranging the place/equipment/practical materials	90	Very good
	2.c. Double-check before leaving the laboratory	89	Very good
Average		**89.9**	**Very good**

To find out the frequency of practical work in schools, students were first asked to answer opening questions before providing responses regarding their perceptions of the implementation of practical work in the science laboratory. In addition to the perception questionnaire, the researcher also conducted direct field observations to examine how often and in what form practicum activities were actually implemented. Based on observations and interviews with teachers, it was found that practicum activities at the school were conducted only about once or twice per semester, usually on topics such as pressure and changes in the state of matter. Most of these activities, approximately 65%, were still in the form of teacher demonstrations, while only about 35% involved students directly in conducting experiments. Furthermore, around 70% of the classes had not yet used standard laboratory equipment such as microscopes, balances, or measuring cylinders. Instead, teachers often used simple, self-made tools. This condition indicates a gap between students' positive perceptions of practicum activities and the actual implementation in the field, which remains limited in both frequency and quality.

The results of a study conducted at SMPN 3 Siak Hulu showed that students' perceptions of the implementation of practicums received a very good rating, with an average score of 89.9%. These results indicate that the majority of students were satisfied with the practicum implementation methods used by the teachers at the school. In terms of practicum preparation, students gave very good ratings for indicators such as understanding the material and objectives of the practicum (87%), preparation before entering the laboratory (87%), and preparation of tools, materials, and the practicum location (90%). This indicates that students felt they were given sufficient explanations before conducting the practicum. Yuliana (2017) stated that the

preparation stage is a very crucial part of practicum activities because this stage aims to provide direction to students regarding what will be done, starting from the objectives of the practicum and the tools and materials needed to the work procedures that must be followed during the practicum. In terms of practicum implementation, the highest indicator was the explanation of the work steps and the use of practicum equipment, which received a score of 94.5%. Students felt that they had been given clear directions regarding the work methods and use of the tools needed in the practicum. Furthermore, the assessment of the implementation of the work steps was also very good (92%), followed by attention to safety, laboratory regulations, and the use of the lab worksheet, which received scores of 91% and 88.6%, respectively. At the closing stage of the lab, aspects such as cleaning and tidying up equipment (90%) and double-checking before leaving the lab (89%) also received high appreciation from students.

Overall, these indicators indicate that students perceive that the implementation of practicum activities at this school is running well, with special attention to safety aspects and adequate laboratory space management. The results of this study are consistent with research conducted by Rahmayumita et al., (2024), which shows that the implementation of practicum activities is categorized as good, meaning that the implementation of practicum activities at school is correct and in accordance with procedures for implementing practicums in science laboratories. In addition, this finding is also in line with Hakim et al., (2022), who stated that well-planned practicums, the availability of facilities and infrastructure, and organized practicum implementation strategies contribute positively to students' perceptions of laboratory activities. However, although students' perceptions of practicums at SMPN 3 Siak Hulu are very positive, in reality there is a discrepancy between this perception and the actual implementation of practicums in the field. Based on observations made, practicums involving the direct use of science laboratory equipment in this class are still very rarely carried out. Most practicum activities carried out are more often in the form of simple experiments or demonstrations by teachers, where students are not directly involved in the use of laboratory equipment or the implementation of the experiments. In many cases, practicums at this school are limited to lectures or discussions about experiments carried out by teachers without providing opportunities for students to conduct their own experiments. This results in students not fully gaining the experience necessary to develop their scientific skills, even though they feel that the practical activities have been carried out well based on their assessment.

However, field observations provide a slightly different picture. Based on observations and interviews with teachers, practical activities in schools are only conducted once or twice a semester, especially on topics such as pressure and changes in state of matter. Most activities, approximately 65%, are still demonstrations by teachers, while the remaining 35% are simple experiments conducted directly by students. Furthermore, most classes (approximately 70%) do not yet use standard laboratory equipment such as microscopes, balances, or measuring cylinders and often use simple teacher-made tools. This is in line with the findings of Prastika et al., (2017); Wirayuda et al., (2022), which state that practical activities in schools are generally conducted at least once a year. Based on research by Adilah et al., (2021), practical activities in junior high schools are also conducted at least once a semester. The implementation of practical activities at SMP N 3 Siak Hulu is still limited by several factors, such as time constraints. Limited time and unsupportive laboratory conditions are the main obstacles to optimally implementing practical activities. Some materials that could have been implemented in practicals could not be implemented due to lack of time and the unavailability of necessary tools and materials. This

indicates a need to improve the quality and quantity of practicals so that students can gain a better experience in science learning (Aryanti & Kusasi, 2016).

Another factor contributing to the limited implementation of these practicums is the educational background of some science teachers, who do not have a background in science. Several teachers at SMPN 3 Siak Hulu admitted to not having an adequate educational background in science, resulting in a lack of confidence in using laboratory equipment and explaining more complex experimental procedures. The teachers' limited knowledge and skills in carrying out these more complex practicums impacted the implementation of the practicums themselves. According to Juniantari (2017), teacher ability or competence has a significant impact on student learning. Because teachers are the primary source of learning in the classroom, if teachers are less competent, the learning process tends to be less engaging and can reduce students' enthusiasm and motivation to learn. As an alternative, teachers tend to choose more conventional teaching methods, such as lectures, question-and-answer sessions, and discussions about science concepts, which are easier to implement even though they do not involve extensive use of laboratory equipment.

Furthermore, limited laboratory facilities in schools are also a hindering factor (Elfa & Hidayah, 2018). Some existing laboratory equipment is outdated and poorly maintained, while the quantity is also insufficient for use by all students in one class. In research conducted by Zainuddin et al., (2019), it was explained that the smooth implementation of laboratory work is influenced by the availability of equipment and how to use it. According to Nurhadi (2018), the availability of adequate facilities and infrastructure in a school plays a crucial role in supporting the smooth learning process. Without the support of facilities that meet minimum standards, school operations will be disrupted and the implementation of laboratory work cannot run optimally. This makes laboratory activities involving the use of laboratory equipment very limited. Some conversations about experiments conducted by teachers are also often not followed by actual laboratory activities, so students lose the opportunity to directly experience the scientific process that should be the core of science learning.

This situation indicates a gap between students' high perceptions and the reality of limited practical implementation in the field. This positive perception likely arises because students lack experience participating in more ideal practical activities. For them, activities accompanied by teacher explanations and simple equipment are considered good practical activities. This aligns with the opinion of Nicol et al., (2022), who stated that students' positive perceptions of science learning are often formed from a pleasant learning environment, even if the implementation does not fully align with the standards of practical activities.

Practical work in science learning is not only intended to facilitate students' understanding of theoretical scientific concepts but also to develop science process skills, including observation, classification, measurement, data processing, and drawing conclusions based on experimental results (Sulistiyono et al., 2019). According to Amir et al., (2021), laboratories, as an external motivating factor, play a crucial role in shaping students' skills and techniques. In addition, a conducive laboratory environment affects students' motivation and attitudes toward science learning (Nadrah, 2025). A good laboratory environment encourages active student engagement even though the frequency of practicums is still limited. Furthermore, laboratories contribute to developing regular and positive learning attitudes and habits (Nahrawi, 2011). These skills are crucial for developing students' scientific mindset, which is useful for solving problems and answering scientific questions with a systematic approach. Therefore, ideal practical work should not only involve observation or demonstrations but also provide students with the opportunity to

actively engage in data collection, analysis, and drawing conclusions from their own experiments.

Referring to these findings, it can be concluded that although students' perceptions of laboratory work at SMPN 3 Siak Hulu tend to be positive, the reality of its implementation still needs to be improved to meet the desired science learning standards. The school needs to evaluate and improve the quality of laboratory work implementation comprehensively. One step that can be taken is to provide training to science teachers, especially those without a science education background, so that they are more confident in operating laboratory equipment and carrying out more complex laboratory work. Furthermore, the maintenance and procurement of more adequate laboratory equipment are also very necessary so that students can be directly involved in laboratory work that is in line with the concepts being studied. Active student involvement is crucial for developing 21st-century skills, such as scientific communication and collaboration (Malik & Ubaidillah, 2021). Therefore, teacher-led demonstration-based practicums should be minimized.

Several factors contribute to the limited implementation of practicums at SMPN 3 Siak Hulu. First, limited study time makes it difficult for teachers to allocate dedicated time for laboratory activities. Second, limited tools and materials for practicums hinder the implementation of more complex experiments. Third, some science teachers at this school lack a science education background, thus feeling less confident in conducting practicums that require mastery of specific tools and procedures. This condition aligns with research by Prastika et al., (2017) and Wirayuda et al., (2022), which states that practicums in secondary schools are generally still rarely conducted due to limited facilities, time, and teacher readiness. Furthermore, limited laboratory facilities are also a major obstacle. Many tools are no longer functioning properly and are insufficient for all students. Zainuddin et al., (2019) explain that the success of practicums is greatly influenced by the availability of adequate tools, materials, and laboratory conditions. Nurhadi (2018) also emphasized that inadequate facilities and infrastructure will directly impact the quality of teaching and learning activities, including practicums.

This situation suggests that students' positive perceptions do not fully reflect the quality of the actual implementation of the practicum. This is consistent with the systematic review by Nicol et al., (2022), which reported that students' direct engagement in laboratory activities is often still low. Students may evaluate it favorably because they feel they received clear explanations and a pleasant learning environment, but this does not necessarily mean they were actively involved in scientific activities that train science process skills. According to Sulistiyono et al., (2019), practicums should be a means for students to develop scientific skills such as observing, measuring, analyzing data, and drawing conclusions. Meanwhile, Amir et al., (2021) added that laboratory activities also play a crucial role in developing students' critical thinking skills and scientific habits. Therefore, although students' perceptions of practicums at SMPN 3 Siak Hulu are very positive, the reality on the ground shows that implementation still needs improvement. The school needs to improve various aspects, such as:

1. Improve the competency of science teachers through training and workshops on laboratory activities.
2. Improve and add laboratory equipment so students can conduct experiments independently.
3. Schedule regular labs, at least twice per semester, with active student involvement.

4. Integrate inquiry-based and STEM learning models to familiarize students with hands-on scientific activities.

With these steps, it is hoped that the implementation of practical work in schools can be more optimal so that students' positive perceptions not only reflect learning satisfaction but also real and meaningful scientific experiences.

CONCLUSION AND SUGGESTIONS

Based on the results of the study, it can be concluded that students at SMPN 3 Siak Hulu have a very positive perception of the implementation of science practicums, with an average score of 89.9%. Students expressed satisfaction with the preparation, implementation, and closing stages of the practicum. However, activities involving the direct use of laboratory equipment were still rarely carried out and were mostly in the form of teacher demonstrations, resulting in limited active student participation. Theoretically, this finding indicates that positive student perceptions do not always represent the ideal implementation of practical learning.

Practically, the results suggest the need for schools and teachers to improve the quality and frequency of practicum activities. Science teachers are encouraged to actively involve students in experiments, strengthen their laboratory management competencies, and make better use of available equipment. Schools should also enhance laboratory facilities and ensure that practicums are scheduled regularly. Furthermore, future research is recommended to explore the relationship between students' perceptions, motivation, and science process skills to gain a deeper understanding of how practicum experiences influence science learning outcomes.

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