



Identification of Laboratory Equipment and Materials in Science Practicum at MTs

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ABSTRACT

The completeness of laboratory equipment and materials makes practicums more optimal when carried out practicums. The aim of this research is to obtain data and explanations that can make science learning better and more effective because the completeness of laboratory tools and materials in practical activities is able to support science learning better. The method used in this research is descriptive research, which does not involve treatment, manipulation, or changes to the subject but only describes the actual situation for analysis. Surveys and interviews with laboratory heads and science teachers about practicum implementation and the state of the science laboratory reveal that MTS Darul Hikmah Pekanbaru has complete science laboratory equipment, but incomplete science laboratory materials. Science classes VII and VIII MTS Darul Hikmah Pekanbaru are at a very good level, and the implementation of the science practicum for class IX MTS Darul Hikmah Pekanbaru is at a good level. Overall, the completeness of laboratory equipment and materials in the science practicum at MTs Dar El Hikmah was identified as being in the good category.

INTRODUCTION

The standardization of science laboratories in the aspects of infrastructure, arrangement, and supervision has been determined in accordance with Permendiknas Number 24 of 2007, which refers to standards for laboratory facilities and infrastructure (Putri et al., 2023). One of the types of facilities and infrastructure in question is related to the completeness of science laboratory equipment found in schools. Student academic success is influenced by a lack of academic attention to field studies and a lack of resources. This can be realized with complete practicum tools (Tarigan & Budiastuti, 2020). The importance of complete science laboratory equipment influences aspects of psychomotor abilities and communication skills (Simbolon et al., 2019). Students' learning motivation in science learning still needs to be improved in science (Kartika et al., 2024; Sabanal et al., 2023). Science Process Skills are another indicator that can be measured when students do science practicum in the laboratory (Sari et al., 2023). So, a more in-depth analysis is needed regarding the completeness of science laboratory equipment.

The urgency of completeness regarding laboratory equipment and materials in science practicum is something that supports the achievement of good science learning and practicum activities (Swestyani et al., 2024). Laboratory tools and materials are a set of items used in practical activities in the laboratory. Tools and materials in the practicum need to be inventoried and identified so that the administration process is easy, such as a list and condition of existing tools, a list of incoming and outgoing tools, and a list of suggestions and requests for tools (Puspitasari & Sosidi, 2017). The highest impact felt is the network, followed by practical sessions, and then the home environment, so

practical sessions at school are more optimal compared to online practical sessions (Ramiah et al., 2021).

A laboratory includes a facility or facility in the world of education or a school in the form of a practical room, practical equipment, practical materials, or other equipment related to laboratory equipment (Noorjanah et al., 2023). The science laboratory is part of the factors that support better science learning, especially in the implementation of science practicum (Setiawati et al., 2021). The laboratory is able to support practicum-based learning, especially in science learning, which is seen in terms of management, neatness, cleanliness, and completeness. A science practicum is a series of activities included in science learning and supported by science equipment, so it requires a laboratory to support the learning process so that it can be carried out optimally. The success of implementing science practicum in schools or madrasahs can be influenced by: (1) the description of equipment availability; (2) teaching materials; (3) administration; and (4) the implementation of practicum activities in the physics laboratory (Anggereni et al., 2021). The science practicum is also able to assist students' activities in learning science in the laboratory category, which meets the minimum standards set in the Minister of National Education Regulation Number 4 of 2007. (Pertiwi et al., 2021).

Practicum supports the realization of maximum learning because practicum is one part of the learning process that aims to give students the opportunity to try and apply the theory they have learned in class (Farikha et al., 2021). Optimal practicum implementation will be achieved if the equipment and practicum materials in the laboratory are complete and well met (Ambarwati et al., 2018). Based on the researcher's Systematic Literature Review (SLR), there is still a lack of skills regarding practicum by students because there are still several schools that do not have adequate facilities, means, and infrastructure for practicum activities. The results of a survey conducted by the government in the Program for International Student Assessment (PISA) show that the science abilities of students in Indonesia are decreasing every year, and the scores obtained are still relatively low. The low PISA Science score in Indonesia is partly due to the lack of learning facilities, especially in the practicum area, because there is some science material that is easy to understand if you do practicum.

Science learning using a laboratory is better than learning outcomes that do not use a laboratory (Muliandi et al., 2019). Educators can apply modules based on a science process approach to increase students' interest in learning because, through this module, students are actively involved in the learning process through practical activities, so they are interested in following the learning process well (Hamid et al., 2023). Other important things that need to be considered in the laboratory are the indicators for preparing the practicum area, equipment, and materials; having worksheets; cleaning; returning; arranging the practicum place, equipment, and materials; and re-examination (Rahmayumita et al., 2019). Science teachers' knowledge about laboratories is also an important factor that best supports the implementation of practicum (Maulina et al., 2019). The 21st century learning paradigm emphasizes students being able to think critically, be able to connect science with real life, communicate, and collaborate so that laboratory facilities support the maximum implementation of 21st century learning (Syukri et al., 2022).

With all practicum tools and materials in good condition, it will dominate the achievement of good practicum activities, so it is necessary to have good laboratory facilities and infrastructure to support students' abilities (Trisianawati et al., 2020). The existence of a laboratory in a school is something that must receive serious attention. The facilities and infrastructure in the laboratory must be adequate to support learning. By structuring and equipping the laboratory with adequate optimal utilization, management will be better and more organized, so that it can support and facilitate all student activities to develop knowledge, especially in science learning (Fitri & Wahyu, 2023).

Based on the background above, there is a gap between theoretical and empirical aspects as well as limitations of previous studies. So researchers need to know and analyze the completeness of laboratory equipment in the science practicum at MTs Dar El Hikmah. So that in the future it can be used as evaluation material to improve the completeness of laboratory equipment in science practicum at MTs Dar El Hikmah so that practicum activities can be carried out well and can meet students' learning needs.

RESEARCH METHODS

Research Approach

This research is descriptive research. This descriptive research does not involve treatment, manipulation, or changes to the subject but only describes the actual situation for analysis. The purpose of this research is to solve current problems and collect data for explanation and analysis.

Research Participants

The object of research in this research is Mts Darul Hikmah Pekanbaru, this school was chosen as the sample in the research because no one has researched laboratory equipment and materials as well as the implementation of practicums at this school. Apart from that, the laboratory owned by Mts Darel Hikmah is adequate as a teaching and learning facility so it is suitable to be used as a research sample. There are 3 social situations in this research. Consists of 3 scopes, namely, place, subject, and activity. The place studied in this research is Mts Darel Hikmah Pekanbaru. The subject in this research is the Head of the Science Laboratory at Mts Darel Hikmah Pekanbaru. science in the science laboratory.

Research Instruments

Data collection instruments used were questionnaires, observation sheets, and interviews. A questionnaire is a data collection method that is carried out by asking several types of questions related to the research problem. In these questions, there are 4 indicators used by researchers, namely: 1) location and laboratory space; 2) completeness of junior high school science laboratory equipment; 3) completeness of junior high school science laboratory materials; and 4) implementation of junior high school science practicum.

Data Collection

The technique used in this research, namely the snowball, is small, non-representative, purposeful, and developed during this research. The instruments used were observation sheets, questionnaires, and interview questions. There are three stages to research procedures: the preparation stage, the implementation stage, and the completion stage. In the preparation stage, the researcher analyzes the material to be used in the research, samples to be analyzed, practical instructions, equipment inventory, laboratory materials, and observation sheets, questionnaires, and questions for interviews. The implementation stage is the stage of collecting data regarding the completeness of science equipment and available science materials, carried out by means of observation and interviews in the Mts. Darel Hikmah Pekanbaru laboratory. Observations of tools and materials were carried out directly by researchers with the help of the head of the laboratory. The implementation of the science practicum was carried out by giving questionnaires to science teachers and conducting interviews with subject teachers regarding the implementation of the science practicum. Obtained data processing and research results at the completion stage.

Data Analysis

The data were analyzed using descriptive analysis with the percentage average technique. Each variable was analyzed, and then a percentage regression was carried out to obtain an overview of the percentage completeness of the science laboratory and the workability of science at Mts. Darel Hikmah Pekanbaru. After knowing the percentage of each variable, the data is converted to obtain the criteria for completeness of equipment, materials, and science laboratory tools and materials at Mts. Darel Hikmah Pekanbaru.

RESULTS AND DISCUSSION

Result

Location and laboratory space

Based on the results of research on the location and parts of the laboratory space, the following criteria were obtained:

- a. The science laboratory room functions as a place for practical science learning activities that require special equipment.
- b. The science laboratory room can accommodate a minimum of one study group.
- c. The minimum ratio of science laboratory space is 2.4 m²/student. For study groups with less than 20 students, the minimum laboratory space is 48 m², including storage and preparation space of 18 m². The minimum width of the science laboratory room is 5 m.
- d. The science laboratory room is equipped with facilities to provide adequate lighting for reading books and observing experimental objects.
- e. Clean water sources are available.
- f. The science laboratory room is equipped with facilities as stated in the laboratory attachment. This has met the standards of Minister of National Education Regulation Number 24 of 2007 concerning Standards for Laboratory Space Facilities and Infrastructure.

Completeness of junior high school science laboratory equipment

From the list of available science equipment, it can be identified that this school has sufficient practical equipment to support science learning activities. There are various kinds of laboratory equipment which includes tools for physics, biology and chemistry experiments. For physics equipment, this school has calipers, stopwatches, weights, Bunsens, digital multimeters, dynamometers, tuning forks, measuring cups, magnifying glasses, pocket meters, pulleys and compound pulleys. This equipment will be very useful for carrying out experiments on mechanics, optics, electricity, and so on. In the field of biology, this school is equipped with microscopes, respirometers, heart torsos and eye torsos, as well as biological experiment manuals. These tools will facilitate students to study the anatomy and physiology of living creatures, as well as carry out microscopic observations.

For chemistry, this school has cups, beakers, and Ohaus balances that can be used to carry out basic chemistry experiments. Apart from that, there is also a Molymod set, which can help students understand molecular structure. Apart from practical equipment, this school is also equipped with various learning media, such as pictures related to biology, physics, and mathematics. Guidebooks for using tools and experimental guides are also available, so they can help students and teachers carry out practical activities well.

Overall, the completeness of science equipment in schools can be said to be quite good and adequate to support science learning activities. However, some equipment is still limited in quantity, such as thermometers, torsos, and Ohaus balances. Increasing the number of these tools can increase flexibility and effectiveness in carrying out practicum. Below is a list of the available equipment.

Table 1. List of available IPA equipment

No	Name	Amount	No	Name	Amount
1.	Vernier calipers	7	26.	First aid	1
2.	Microscope	6	27.	10 cm dropper pipette	3
3.	Stopwatch	5	28.	Biology activity sample guidebook	1
4.	Cup	6	29.	Mechanics handbook	5
5.	Load 5,10,20,30,50,100 gr.	6	30.	Optics handbook	7
6.	Bunsen	5	31.	A guidebook for using biological tools	6
7.	Digital multimeter	6	32.	Magnetic electrical tool kit manual	4
8.	Dynamometer	4	33.	Handbook of hydrostatics and heat experiments	6
9.	Tuning fork	6	34.	Image of human excretion	1
10.	Measuring cups 500, 100, 250, 500 ml	6	35.	Draw a tangent line to the circle	3
11.	Magnifying glass	6	36.	Image of plant tissue	1
12.	Pocket meter	6	37.	Pictures of various types of pollination	35
13.	Respirometer	6	38.	Image of life organization	1
14.	Thermometer	3	39.	Image of generative development	2

15.	Cardiac torso	3	40.	Image of vegetative development	2
16.	Eye torso	1	41.	Image of stages of human growth and development	1
17.	Wood beam	4	42.	Draw circle elements	2
18.	Inclined plane	1	43.	Draw the central angle and circumference of the circle	2
19.	100 ml baker's glass	1	44.	Hypocular lens microscope	1
20.	Tripod	5	45.	3 arm ohaus balance	1
21.	Pulley	6	46.	100 cm wooden ruler	1
22.	Compound pulley	1	47.	100 cm plastic ruler	1
23.	Molymod set	3	48.	Digestive torso	1
24.	Maschenbreak	11	49.	Circulatory torso	1
25.	4 arm ohaus balance	1			

Completeness of junior high school science laboratory materials

This school has a variety of comprehensive practical equipment and supports comprehensive science learning activities. Based on the list of practical materials provided, this school has quite a diverse collection, including marine animal specimens such as marine algae, eels, chameleons, sea urchins, puffer fish, catfish, and goldfish. Apart from that, the school also provides other marine animals, such as crabs, snails, and sea whales.

Table 2. List of Materials and Results of Science Experiments

NO	Name	Amount	NO	Name	Amount
1.	Food test kit	1	12.	Marine algae	1
2.	70% alcohol solution	1	13.	Eel	1
3.	Benedict's solution	1	14.	Chameleon	1
4.	Chloroform solution	1	15.	Sea urchins	1
5.	1m hcl solution	1	16.	Puffer fish	1
6.	Lugol's solution	1	17.	Catfish	1
7.	NAOH solution	1	18.	Goldfish	1
8.	Spirit solution	1	19.	Crab	1
9.	Solution	1	20.	Snail	1
10.	Vaseline 500 gr	1	21.	Pace the sea	1
11.	Brown algae	1			

Implementation of Middle School Science Practicum

Practicum is an important component that helps students understand scientific concepts more deeply in science learning in junior high school. This school has provided complete science laboratory equipment, which includes various biological specimens, chemicals, and other practical support tools.

Even though it is only supported by one laboratory teacher, the implementation of the science practicum at this school can run smoothly. The laboratory teacher acts as a facilitator who ensures that all practical equipment is available and ready for use by students. Each practical activity is allocated 4-5 hours of meeting time in the laboratory. This duration is sufficient for students to carry out experiments, observations, and comprehensive data analysis. The laboratory teacher provides initial guidance, guides the practicum, and helps students interpret the results of observations. With complete practical equipment and adequate laboratory teacher guidance, students can be actively involved in practical activities. They can use various biological specimens, carry out chemical tests, and operate laboratory equipment according to practical instructions. This supports students' conceptual understanding as well as developing their science process skills.

Discussion

The MTS Darel Hikmah laboratory profile is a description of the laboratory room from several aspects. Because the facts or descriptions of a laboratory are very broad, characteristics are taken from aspects of laboratory location and space management, completeness of laboratory equipment and materials, storage of laboratory equipment and materials, maintenance of laboratory equipment, organization and administration of the laboratory, use of the laboratory, provision and preparation of equipment and materials, laboratory work safety, and cleanliness of laboratory space and furniture (Suhendra, 2012: 15). Indicators for preparing the practicum place, equipment, and materials, having a worksheet, cleaning, returning, tidying up the place/practice/equipment/materials, and rechecking before leaving laboratory, in order to improve the implementation of an adequate science laboratory (Rahmayumita et al., 2019). MTS Darel Al Hikmah also has various practicum tools that are more specific for each branch of science. Schools must have practical equipment that can support experimental activities in the fields of biology, physics, and chemistry. In the field of biology, apart from microscopes and calipers, this school also has equipment such as preserved preparations, anatomical torsos, and respirometers (Silaban, R., 2021).

This is in accordance with research (Sulistiyowati et al, 2019), which states that this equipment is important for improving students' science process skills and understanding of biological concepts. Meanwhile, in the field of physics, this school is equipped with practical equipment such as pulleys, dynamometers, and multimeters. The effectiveness of using physics practical tools emphasizes that these tools are very helpful in visualizing physics concepts and improving student learning outcomes (Rafiqah, 2022). Apart from that, MTS Darel Al Hikmah has also provided various learning media to support science practicum, such as pictures, torsos, and practicum guidebooks. These media can help students understand science concepts in a more concrete and interesting way (Meita, 2019). Laboratory Work-Based Physics Modules with a Science Process Skills Approach can increase interest high school students (Hamid et al., 2023).

To support practical activities in the field of biology, the school also provides various chemical solutions such as 70% alcohol, Benedict's solution, chloroform, 1M HCl, Lugol's solution, NaOH, and spirit. There are also food testing kits that can be used to identify the content of substances in food. The completeness of this practical equipment shows the school's commitment to providing adequate facilities for science learning. By having complete specimens of animals, plants, and chemicals, students can carry out various practical activities and experiments optimally, so as to increase their understanding of science concepts. The use of laboratory equipment in science learning is very important to improve the quality of learning and student learning outcomes. Complete and well-functioning laboratory equipment can help students understand science concepts well. In research (Zakiyah et al., 2022) it was found that the use of laboratory equipment that is appropriate to science material improves students' abilities in various aspects and can also improve the quality of science learning. Teachers can more easily simulate various conditions and demonstrate various real science processes in front of the class with the help of practical equipment. This makes the learning process more interactive and interesting for students (Yoland et al., 2019)

Research conducted by Candra and Hidayati, (2020) states that a lack of practicum equipment can hinder the implementation of practicum as well as the development of students' process skills and work skills. So, to overcome this problem, prevention can be carried out by providing planning, maintenance, and cleaning of facilities and infrastructure for laboratory management, which is useful in analyzing needs such as reporting the need for tools and materials from each science teacher, which will then be submitted to the head of the laboratory to be submitted to school principals, to make it easier to procure laboratory equipment and materials (Alfiyatun et al., 2024). Overall, the list of practical equipment provided by this school reflects the school's efforts to facilitate comprehensive and quality science learning for students.

The implementation of science practicum at this school can run well even though it is only supported by one laboratory teacher, thanks to the complete practicum equipment available. The time allocation of 4-5 hours also allows students to be optimally involved in each practicum activity. Apart from that, the implementation and effectiveness of practice can run optimally with the availability of a science laboratory management module (Widiyanto et al., 2022). Another supporting factor is the

presence of laboratory assistants as managers of laboratory facilities and infrastructure, which causes the practicum to run more optimally (Hidayat et al., 2023).

According to Marcella et al. (2018) the success of practical activities depends on the effective use of laboratories. This effectiveness greatly influences the success of learning and is determined by how often the laboratory is used as well as how it is organized, both in terms of laboratory management personnel and students involved in the practicum. The implementation and effectiveness of laboratory management include the use of the laboratory, work safety, carrying out regulations, and also the procurement of equipment and materials (Nurhamudin, 2024). The implementation of laboratory management at MTS Dar El Hikmah has been going well, but certain practical materials will still be provided if needed.

CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that the science laboratory equipment at MTS Darul Hikmah Pekanbaru is at a complete level, while the science laboratory materials are at an incomplete level. The implementation of Class VII and VIII science practicums is at a very good level, and the implementation of Class IX science practicum is at a good level. Overall, the completeness of laboratory equipment and materials in the science practicum at MTs Dar El Hikmah was identified as being in the good category.

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