

Analysis of Science Laboratory Facilities, Infrastructure, and Utilization among Grade IX Students in Junior High Schools across Sinjai Borong District

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui: (1) kondisi sarana dan prasarana laboratorium IPA di SMP/MTs se-Kecamatan Sinjai Borong, serta (2) intensitas pemanfaatan laboratorium IPA di SMP/MTs se-Kecamatan Sinjai Borong. Penelitian ini menggunakan pendekatan deskriptif dengan jenis penelitian kualitatif. Guru biologi berperan sebagai sumber data utama, berfungsi sebagai informan untuk memberikan informasi terkait pemanfaatan laboratorium. Data dikumpulkan melalui metode wawancara dan dokumentasi guna memperoleh gambaran yang komprehensif. Hasil penelitian menunjukkan bahwa ketersediaan sarana dan prasarana laboratorium IPA di berbagai SMP/MTs se-Kecamatan Sinjai Borong memiliki kondisi yang beragam, yang dipengaruhi oleh kebijakan masing-masing sekolah serta dukungan fasilitas yang tersedia. Intensitas pemanfaatan laboratorium IPA juga bervariasi antar sekolah dalam satu semester pembelajaran. Beberapa sekolah telah menerapkan jadwal praktikum yang relatif intensif, yaitu hingga 15 kali praktikum untuk lima materi pembelajaran yang berbeda. Namun, pada sekolah lain, pelaksanaan praktikum masih terbatas, yaitu berkisar antara 2 hingga 6 kali dalam satu semester. Perbedaan intensitas pemanfaatan laboratorium ini dipengaruhi oleh kompleksitas materi pembelajaran, ketersediaan alat dan bahan laboratorium, serta kebijakan sekolah dalam mengelola kegiatan praktikum IPA.

ABSTRACT

This study aimed to investigate (1) the condition of science laboratory facilities and infrastructure in junior high schools across Sinjai Borong District and (2) the intensity of science laboratory utilization in these schools. The study employed a qualitative descriptive approach, with biology teachers serving as the primary informants who provided information regarding laboratory utilization. Data were collected through interviews and document analysis to obtain a comprehensive understanding of laboratory conditions and utilization practices. The findings revealed considerable variation in the availability and condition of science laboratory facilities and infrastructure across schools, largely influenced by school-level policies and the availability of supporting resources. The intensity of laboratory utilization also varied substantially among schools over the course of a semester. Some schools implemented relatively intensive practical schedules, conducting up to 15 laboratory sessions across five different learning topics. In contrast, other schools conducted only two to six practical sessions per semester. These differences in laboratory utilization were associated with the complexity of the subject matter, the availability of laboratory equipment and materials, and school policies governing the management and implementation of science practical activities.

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Introduction

Laboratories play a pivotal role in the science education curriculum. Laboratory activities have substantial potential to serve as effective instructional tools and learning media that guide students through the learning process, enhance their interest in science, and ultimately contribute to improved learning outcomes (Rahman, 2017). Educational facilities and infrastructure are likewise essential components in ensuring the effective implementation of teaching and learning activities at all levels of education. The importance of adequate educational facilities and infrastructure has been emphasized in several Indonesian regulations, including Government Regulation No. 19 of 2005 in conjunction with Government Regulation No. 32 of 2013 concerning National Education Standards, as well as Ministerial Regulation No. 24 of 2007 concerning Standards for School Facilities and Infrastructure. According to Chapter VII, Article 42 of Government Regulation No. 32 of 2013, every educational institution is required to provide educational facilities, including furniture, instructional equipment and media, books and other learning resources, consumable materials, and other equipment necessary to support a systematic and continuous learning process. In addition, educational institutions are required to provide adequate infrastructure, including land, classrooms, administrative and staff rooms, libraries, laboratories, workshops, production units, cafeterias, utility installations, sports facilities, places of worship, recreational and play areas, and other facilities necessary to ensure that the learning process can be implemented effectively and sustainably (Fatmawati, Mappincara, & Habibah, 2019).

According to the Regulation of the Indonesian Minister of National Education No. 24 of 2007, a science laboratory should be able to accommodate at least one class group consisting of approximately 20 students. Structurally, the laboratory should include, at a minimum, a practical work area, a storage room, and a preparation room. In addition, science laboratories should be equipped with adequate supporting facilities, including sufficient lighting to facilitate reading and observation activities, as well as access to clean water to support the implementation of laboratory-based learning (Rahman, 2017).

The success of the learning process and the achievement of educational objectives largely depend on the availability of adequate educational facilities and infrastructure. Inadequate facilities may hinder the implementation of learning activities and, consequently, become an important factor affecting students' learning success. Therefore, schools are responsible not only for providing sufficient facilities and infrastructure but also for managing and utilizing them effectively to ensure that classroom learning activities can be conducted smoothly and efficiently (Dalimunthe & Sapri, 2023).

Biology is a scientific discipline that emphasizes not only the mastery of knowledge in the form of facts, concepts, and principles, but also the scientific processes involved in understanding

the phenomena of life. Biology learning at the senior high school level is intended to equip students with an understanding of themselves and their surrounding environment, as well as the ability to apply biological concepts in everyday life (Febrianti, 2018).

Learning is a process of behavioral change that encompasses the ability to acquire, apply, and evaluate knowledge, attitudes, and fundamental values. As an integral component of education, the teaching and learning process occurs through reciprocal interactions between teachers and students. Within these interactions, educators play a crucial role as facilitators who support and guide the overall learning process (Lubis, 2021).

Education is regarded as an essential aspect of human life, ensuring that every individual in Indonesia has the right to access education and continuously develop through it. Education is therefore understood as a continuous and lifelong process that supports individual growth and development throughout the lifespan (Alpian et al., 2019). Education is a deliberately designed process in which educators guide students in acquiring knowledge through the use of various learning resources so that predetermined learning objectives can be achieved. Within the 2013 Curriculum, this educational process adopts a student-centered approach that places learners at the core of the learning experience. This approach encourages students to participate actively and creatively in constructing knowledge and developing the skills they are expected to acquire (Fadhilah, Rivai, & Syamsul, 2024).

Previous studies with similar characteristics have been conducted by Melenia Lestari Putri et al. (2023), Rafiqah (2022), Anita Cristy Simatupang and Aida Fitriani Sitompul (2018), and Putri Agustina (2017), focusing on the adequacy of science laboratory facilities and infrastructure as well as laboratory utilization at the junior high school level. The present study differs from these earlier investigations by placing greater emphasis on the analysis of laboratory facilities, infrastructure, and utilization in relation to their role in supporting students' learning outcomes. Accordingly, this study aims to evaluate the extent to which the facilities, infrastructure, and utilization of science laboratories in three junior high schools in Sinjai Borong District comply with the standards stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007.

Methodology

This study was conducted in five junior high schools located in Sinjai Borong District, namely Public Junior High School 11 Sinjai, Public Junior High School 39 Sinjai, Public Junior High School 36 Sinjai, State Islamic Junior High School 2 Sinjai, and Al-Ikhwan Pasir Putih Islamic Junior High School. These schools were selected because they are situated within the Sinjai Borong District and have science laboratories that support instructional activities. The study employed a qualitative descriptive approach, with science teachers and Grade IX students from the participating schools serving as the primary data sources. Data were collected through observations, interviews,

and document analysis using interview guidelines and an observational checklist as the main research instruments. Data analysis involved the stages of data reduction, data display, conclusion drawing, and verification. NVivo software was used to support the organization, coding, analysis, and interpretation of the qualitative data.

Results and Discussion

Data on the adequacy of science laboratory facilities and infrastructure, laboratory utilization, and their perceived impact on the learning outcomes of junior high school students in Sinjai Borong District were primarily obtained through interviews. The interview protocol consisted of nine main questions, which could be further developed through follow-up probing to elicit more in-depth information regarding the utilization of science laboratories. In addition, data obtained from the observational checklist were used as supporting evidence to strengthen and complement the findings derived from the interviews.

Adequacy of Science Laboratory Facilities and Infrastructure in Junior High Schools across Sinjai Borong District

Data on the adequacy of science laboratory facilities and infrastructure in junior high schools across Sinjai Borong District were collected using an observational checklist. The checklist was developed based on the Regulation of the Indonesian Minister of National Education concerning standards for educational facilities and infrastructure at the primary, junior high, and senior high levels. The instrument served as a standardized reference for data recording, thereby enabling the researchers to obtain more accurate and systematic information regarding the adequacy of science laboratory facilities and infrastructure.

Public Junior High School 11 Sinjai

The observational checklist results indicated that the science laboratory at Public Junior High School 11 Sinjai was not yet fully compliant with the standards stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007. The observed components included laboratory furniture, educational equipment, instructional media, and other supporting facilities. The findings showed that the laboratory furniture remained incomplete, with several essential facilities, including a demonstration table, preparation table, and sink, being unavailable. These limitations reduced the laboratory's capacity to optimally support science learning activities. This condition highlights the need to improve laboratory facilities and infrastructure so that the science laboratory can function in accordance with the applicable standards while supporting effective and safe teaching and learning activities for both teachers and students.

Based on the same regulatory standards, the analysis of educational equipment in the science laboratory indicated that Public Junior High School 11 Sinjai had not yet fully met the required standards. Of the 40 types of equipment expected to be available, 26 did not comply with the stipulated requirements in terms of either availability or quantity. The equipment that failed to meet the standards included rulers, vernier calipers, stopwatches, measuring tapes, 100°C thermometers, metal masses, multimeters, bar magnets, globes, solar system models, tuning forks, inclined planes, fixed and movable pulleys, wooden blocks, linear expansion apparatus, simple molecular models, evaporating dishes, as well as various diagrams or models of the digestive, circulatory, respiratory, and human throat systems, and experimental instruction guides. In contrast, the instructional media met the required standard, as evidenced by the availability of a 90 cm × 200 cm whiteboard. However, laboratory safety equipment remained inadequate, as no first-aid kit was available and other safety-related facilities were limited to electrical outlets. These findings indicate that the laboratory had not yet fully met the required occupational health and safety standards.

In terms of floor area, the science laboratory at Public Junior High School 11 Sinjai covers 108 m², thereby meeting and exceeding the minimum standard of 48 m² with a minimum width of 5 meters. The laboratory is also equipped with adequate lighting to support reading activities and the observation of experimental objects. In addition, the preparation and storage room has an area of 18 m², measuring 9 meters in length and 2 meters in width. These dimensions comply with the minimum requirements stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007, indicating that the room is appropriately designed to support laboratory activities and fulfill its intended functions.

According to the standards stipulated in the Regulation of the Indonesian Minister of National Education, a science laboratory should ideally consist of six functional areas: a teaching and learning room, a preparation room, a storage room, a dark room, a weighing room, and a glass room. At Public Junior High School 11 Sinjai, the storage room is used to store equipment that is not currently in use and is equipped with cabinets and shelving; however, its area is only 12 m², which falls below the minimum requirement of 20 m². Overall, the science laboratory at this school comprises only three of the six required rooms, namely the teaching and learning room, preparation room, and storage room. Thus, the laboratory currently meets approximately 50% of the prescribed facility and infrastructure standards. These findings indicate the need for further improvements in laboratory facilities to ensure that science learning can be supported more effectively and optimally.

Public Junior High School 39 Sinjai

Based on the observational checklist results, the science laboratory facilities at Public Junior High School 39 Sinjai, including furniture, educational equipment, instructional media, and other supporting facilities, did not fully comply with the standards stipulated in the Regulation of the

Indonesian Minister of National Education No. 24 of 2007. Nevertheless, essential laboratory furniture, including tables, chairs, storage cabinets for equipment and materials, and sinks, was fully available and met the prescribed ratios established in the regulation. This indicates that the basic requirements for learning activities and laboratory storage were adequately fulfilled.

According to the Regulation of the Indonesian Minister of National Education No. 24 of 2007, science laboratories at the junior high school level should be equipped with at least 41 types of educational equipment. The observational findings indicated that the science laboratory at Public Junior High School 39 Sinjai did not yet fully meet these requirements. Of the 41 required items, 27 were either unavailable or did not meet the prescribed quantity ratios. The equipment that failed to meet the standards included rulers, vernier calipers, measuring tapes, balances, metal masses, multimeters, bar magnets, globes, solar system models, tuning forks, inclined planes, fixed pulleys, movable pulleys, wooden blocks, linear expansion apparatus, simple molecular models, evaporating dishes, tripods, magnifying glasses, genetics posters, human skeleton models, human body models, human digestive system models, human circulatory system models, human throat models, and experimental instruction guides. In contrast, the instructional media met the required standard, as indicated by the availability of a 200 cm × 100 cm whiteboard. However, safety equipment remained inadequate because a first-aid kit was not available, while other supporting facilities were limited to electrical outlets, waste bins, and a wall-mounted bulletin board.

In terms of floor area, the science laboratory at Public Junior High School 39 Sinjai covers 70 m², thereby meeting the minimum standard stipulated in the Regulation of the Indonesian Minister of National Education, namely 48 m² with a minimum width of 5 meters. The laboratory is also equipped with adequate lighting, allowing reading activities and the observation of experimental objects to be conducted effectively. The preparation and storage room has an area of 10 m², measuring 6 meters in length and 2 meters in width, and was considered to comply with the prescribed standards for preparation and storage spaces as stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007.

In addition to spatial dimensions and equipment, the standards stipulated by the Regulation of the Indonesian Minister of National Education require junior high school science laboratories to comprise six functional areas: a teaching and learning room, preparation room, storage room, dark room, weighing room, and glass room. The storage room is intended for equipment that is not currently in use, and its function at Public Junior High School 39 Sinjai was consistent with this requirement. However, the storage room covers only 15 m², which falls below the minimum required area of 20 m². Furthermore, of the six required functional areas, the laboratory has only two, namely the teaching and learning room and the storage room. These findings indicate that the science laboratory facilities and infrastructure at Public Junior High School 39 Sinjai have not yet fully met the prescribed standards.

State Islamic Junior High School 2 Sinjai

Based on the observational checklist results, the science laboratory facilities at State Islamic Junior High School 2 Sinjai, including furniture, educational equipment, instructional media, and other supporting facilities, did not fully comply with the standards stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007. However, essential laboratory furniture, including tables, chairs, storage cabinets for equipment and materials, and sinks, was fully available and met the prescribed standard ratios.

According to the Regulation of the Indonesian Minister of National Education No. 24 of 2007, science laboratories at the junior high school level should be equipped with at least 41 types of educational equipment. The evaluation results indicated that the science laboratory at State Islamic Junior High School 2 Sinjai did not fully meet these standards, as 15 items failed to comply with the prescribed requirements in terms of quantity or ratio. These included vernier calipers, stopwatches, measuring tapes, multimeters, bar magnets, tuning forks, inclined planes, pulleys, wooden blocks, simple molecular models, tripods, human skeleton models, diagrams or models of the human throat, and experimental instruction guides. In addition, safety equipment, particularly fire extinguishers and first-aid supplies, required further attention. In contrast, the instructional media met the required standards, as evidenced by the availability of a 200 cm × 190 cm whiteboard in accordance with the requirements stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007. Other supporting facilities were also available, including electrical outlets, a first-aid kit, a wall clock, and waste bins.

According to the Regulation of the Indonesian Minister of National Education No. 24 of 2007, science laboratories at the junior high school level should have a minimum floor area of 48 m² and a minimum width of 5 meters to ensure that teaching and learning activities can be conducted effectively. The science laboratory at State Islamic Junior High School 2 Sinjai covers an area of 80 m² and therefore meets the prescribed minimum spatial requirement. In addition to its adequate size, the laboratory is equipped with sufficient lighting to support reading, observation, and scientific experimentation. Meanwhile, the preparation and storage room has an area of 6 m², with dimensions of 6 meters in length and 2 meters in width. Although this area is smaller than the minimum standard of 20 m², the room was considered functionally adequate for supporting the preparation and storage of laboratory equipment.

In addition to spatial requirements, the Regulation of the Indonesian Minister of National Education No. 24 of 2007 stipulates that a science laboratory should comprise six functional areas: a teaching and learning room, a preparation room, a storage room, a dark room, a weighing room, and a glass room. Observational findings showed that the science laboratory at State Islamic Junior High School 2 Sinjai contained only three of these areas, namely the teaching and learning room,

preparation room, and storage room. The storage room functioned in accordance with its intended purpose as a space for keeping equipment that was not currently in use and was equipped with cabinets and shelving. However, its floor area was only 12 m², which was below the minimum requirement of 20 m². These findings indicate that the science laboratory at State Islamic Junior High School 2 Sinjai met only approximately 50% of the prescribed facility and infrastructure standards, highlighting the need for further improvements to support more effective science learning.

Al-Ikhwan Pasir Putih Islamic Junior High School

Based on the observational checklist results, the science laboratory facilities at Al-Ikhwan Pasir Putih Islamic Junior High School, including furniture, educational equipment, instructional media, and other supporting facilities, did not fully comply with the standards stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007. However, the laboratory furniture, including tables, chairs, storage cabinets for equipment and materials, and sinks, was fully available and met the prescribed ratios established in the regulation.

In addition, according to the Regulation of the Indonesian Minister of National Education No. 24 of 2007, science laboratories at the junior high school level should be equipped with 41 types of educational equipment. The evaluation results indicated that Al-Ikhwan Pasir Putih Islamic Junior High School had not yet fully met these standards, as nine items did not comply with the prescribed requirements in terms of availability or quantity. These included wooden blocks, linear expansion apparatus, evaporating dishes, human skeleton models, diagrams or models of the human throat, and experimental instruction guides. Some supporting safety equipment, such as fire extinguishers and first-aid supplies, was also reported to be unavailable. In contrast, the instructional media met the required standards, as evidenced by the availability of a 180 cm × 200 cm whiteboard. Other supporting facilities, including electrical outlets, a first-aid kit, a wall clock, and waste bins, were also available, with the fire extinguisher being the only item that remained unavailable.

In terms of floor area, the Regulation of the Indonesian Minister of National Education No. 24 of 2007 stipulates that a science laboratory should have a minimum area of 48 m² and a minimum width of 5 meters. The science laboratory at Al-Ikhwan Pasir Putih Islamic Junior High School covers an area of 90 m² and therefore meets the prescribed minimum spatial requirement. The laboratory is also equipped with adequate lighting to support reading activities and the observation of experimental objects. Meanwhile, the preparation and storage room covers an area of 12 m², measuring 6 meters in length and 2 meters in width, and was considered to comply with the applicable standards.

In addition to spatial requirements, a science laboratory should ideally comprise six functional areas: a teaching and learning room, a preparation room, a storage room, a dark room, a weighing room, and a glass room. At Al-Ikhwan Pasir Putih Islamic Junior High School, the storage room is used to accommodate equipment that is not currently in use and is equipped with cabinets and shelving; however, its floor area is only 12 m², which falls below the minimum requirement of 20 m². Overall, the laboratory contains only three of the six required functional areas, namely the teaching and learning room, preparation room, and storage room. These findings indicate that the science laboratory at Al-Ikhwan Pasir Putih Islamic Junior High School currently meets approximately 50% of the prescribed facility and infrastructure standards.

Public Junior High School 36 Sinjai

Based on the observational checklist results, the science laboratory facilities at Public Junior High School 36 Sinjai, including furniture, educational equipment, instructional media, and other supporting facilities, did not fully comply with the standards stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007. Laboratory furniture, including tables, chairs, storage cabinets for equipment and materials, and sinks, was fully available and met the prescribed ratios. However, of the 41 types of equipment required for a science laboratory, 19 did not meet the stipulated standards in terms of availability or quantity. These included vernier calipers, stopwatches, measuring tapes, multimeters, bar magnets, tuning forks, inclined planes, fixed and movable pulleys, wooden blocks, simple molecular models, tripods, human skeleton and body models, diagrams or models of the human throat, and experimental instruction guides.

In addition, the laboratory's supporting facilities were not yet fully adequate. A fire extinguisher and first-aid kit were unavailable, whereas other supporting items, including electrical outlets, waste bins, and a wall clock, were already provided. The instructional media met the required standards, as evidenced by the availability of a 200 cm × 190 cm whiteboard in accordance with the relevant regulatory provisions. These findings indicate that, although several basic facilities were already available, the science laboratory at Public Junior High School 36 Sinjai still requires further improvement, particularly in terms of safety equipment and the availability of essential laboratory apparatus.

In terms of floor area, the science laboratory covers 110 m², exceeding the minimum requirement of 48 m² with a minimum width of 5 meters as stipulated by the relevant regulation. The laboratory is also equipped with adequate lighting to support reading activities and the observation of experimental objects. The preparation and storage room covers an area of 10 m², measuring 6 meters in length and 2 meters in width. Although this space was considered functionally adequate for preparation and storage activities, it remains smaller than the

recommended standard of 20 m². These findings indicate that the main laboratory space is adequate, whereas the supporting areas still require further improvement.

According to the standards stipulated by the Regulation of the Indonesian Minister of National Education, a science laboratory should ideally comprise six functional areas: a teaching and learning room, a preparation room, a storage room, a dark room, a weighing room, and a glass room. At Public Junior High School 36 Sinjai, however, the laboratory contains only three of these areas, namely the teaching and learning room, preparation room, and storage room. The storage room has been appropriately used for storing equipment that is not currently in use and is equipped with cabinets and shelving; however, its floor area is only 12 m², which falls below the minimum requirement of 20 m². Overall, these findings indicate that the science laboratory at Public Junior High School 36 Sinjai currently meets only approximately 50% of the prescribed facility and infrastructure standards, highlighting the need for further improvements to support more effective and optimal science learning.

The availability of science laboratory facilities across junior high schools varies considerably, depending on school policies and the level of infrastructural support available. Some schools, such as Al-Ikhwan Pasir Putih Islamic Junior High School, have relatively adequate laboratory facilities for practical activities, although several items of equipment are damaged. In other schools, laboratory provision is supported by basic equipment and additional facilities, such as internet access, to enhance the learning process. However, not all schools have optimal laboratory conditions, as the availability and quality of facilities are often influenced by school budgets and the level of attention given by school management. Overall, well-equipped and properly maintained laboratories constitute an important factor in supporting the effectiveness of science learning at the junior high school level.

These findings are consistent with those reported by Candra & Hidayati (2020), who found that physics laboratories had not fully met the facility and infrastructure standards stipulated in the Regulation of the Indonesian Minister of National Education No. 24 of 2007. This condition was primarily attributed to limited school budgets for purchasing new equipment or replacing damaged items, which constrained the availability of adequate laboratory resources for students. Consequently, the limited utilization of laboratory equipment was associated with lower average student learning outcomes. Insufficient equipment and supporting facilities required for physics instruction may hinder the effectiveness of the teaching and learning process and contribute to lower levels of student achievement.

In addition, laboratories play an important role in facilitating students' understanding of science concepts. Students tend to develop a better understanding of scientific concepts when they are directly engaged in experimental activities rather than relying solely on theoretical explanations (Zakiah et al., 2022). Therefore, the availability of well-equipped and fully functional laboratories

can substantially support deeper conceptual understanding and contribute to improved student learning outcomes.

Utilization of Science Laboratories in Junior High Schools across Sinjai Borong District

Data on the utilization of science laboratories in junior high schools across Sinjai Borong District were collected through interviews. The interview protocol consisted of nine main questions, which could be further developed through follow-up probing to obtain more in-depth information regarding science laboratory utilization. In addition, data collected using the observational checklist were used as supporting evidence to strengthen and complement the findings derived from the interviews.

Public Junior High School 11 Sinjai

Interview Results with Science Teachers and Students at Public Junior High School 11 Sinjai Regarding the Adequacy of Science Laboratory Facilities, Infrastructure, and Utilization.

Adequacy of Facilities and Infrastructure

Interviews with science teachers revealed that the availability of facilities and infrastructure in the science laboratory at Public Junior High School 11 Sinjai remained highly limited. The existing laboratory facilities were considered inadequate, particularly in terms of the suitability of equipment and materials for practical activities. Only some learning topics were supported by laboratory equipment that matched the requirements of the intended practical work. In addition, the teachers reported that several pieces of equipment were damaged, while certain laboratory materials were no longer suitable for use or had expired. These limitations reduced the effectiveness of laboratory-based learning activities.

These findings were further supported by interviews with students, who reported that the science laboratory facilities at the school were still insufficient. The students also indicated that the learning materials were not fully aligned with the laboratory equipment and materials available for practical activities. Furthermore, they reported that several pieces of equipment, including microscopes, were damaged and that some laboratory materials had exceeded their expiration dates. These conditions highlight the need to improve laboratory facilities and infrastructure so that science learning can be conducted more effectively, safely, and in accordance with established educational standards.

Intensity of Laboratory Utilization

Based on interviews with science teachers, the science laboratory was generally utilized once every three instructional sessions. The frequency of laboratory use was highly dependent on the

availability of equipment and materials. In addition, practical activities were not conducted according to a fixed schedule but were implemented as needed, depending on the learning topic being taught at the time.

Meanwhile, interviews with students revealed that the science laboratory at Public Junior High School 11 Sinjai was rarely utilized. The students reported that laboratory activities were conducted only once, or in some cases not at all, during a semester. Consistent with the teachers' accounts, the students also stated that no fixed laboratory schedule was available at the school and that the laboratory was used only when practical activities were considered relevant to the topic being taught by the respective teacher.

Public Junior High School 39 Sinjai

Interview Results with Science Teachers and Students at Public Junior High School 39 Sinjai Regarding the Adequacy of Science Laboratory Facilities, Infrastructure, and Utilization.

Adequacy of Facilities and Infrastructure

Interviews with science teachers revealed that the availability of laboratory equipment and materials was generally insufficient to fully support learning activities. Nevertheless, the teachers expressed a somewhat more positive view of the condition of the available equipment, indicating that it remained safe and usable for practical activities. Regarding the suitability of the laboratory equipment and materials, the teachers considered the available resources to be reasonably aligned with the current learning topics.

In contrast, the student interviews provided a more critical perspective. According to the students, the laboratory equipment and materials were not yet sufficient to optimally support learning activities. With regard to their condition, the students reported that some materials were no longer suitable for use and that several pieces of equipment were damaged.

Intensity of Laboratory Utilization

According to the science teachers, the laboratory was used approximately three to four times per semester for each class, depending on the learning topics being taught. Although the frequency of use was reported, the teachers acknowledged that no formal or fixed schedule documenting laboratory utilization was available.

However, the students reported that the science laboratory at Public Junior High School 39 Sinjai was rarely used during the semester, and in some cases, no practical activities were conducted at all. Consistent with the teachers' accounts, the students also confirmed that the school did not have a fixed schedule for laboratory activities.

Public Junior High School 36 Sinjai

Interview Results with Science Teachers and Students at Public Junior High School 36 Sinjai Regarding the Adequacy of Science Laboratory Facilities, Infrastructure, and Utilization.

Adequacy of Facilities and Infrastructure

Interviews with science teachers indicated that the laboratory equipment and materials were considered sufficiently adequate and generally aligned with the learning topics currently being taught. The availability of these resources was also accompanied by an appropriate match between the practical equipment and materials and the relevant subject matter. However, with regard to their physical condition, the teachers acknowledged that some equipment was damaged and that several laboratory materials had expired. Nevertheless, the teachers emphasized that the school was making ongoing efforts to replace and update these resources.

The students' perspectives generally supported the teachers' statements regarding the adequacy of laboratory resources. The students considered the availability of equipment and materials in the science laboratory to be sufficient and generally aligned with the learning topics being taught. However, with regard to their condition, the students reported that some of the equipment and materials were damaged or no longer suitable for use.

Intensity of Laboratory Utilization

The science teachers stated that the science laboratory was frequently used during science lessons. However, the frequency of practical activities for each class was approximately five to six sessions per semester. The teachers also clarified that there was no fixed practical schedule; instead, laboratory use was directly adjusted to the learning topics being taught.

In contrast to the frequency reported by the teachers, the students perceived that the science laboratory at Public Junior High School 36 Sinjai was used frequently, even stating that it was utilized during every science lesson. Nevertheless, the students also confirmed that no formal laboratory schedule had been established.

State Islamic Junior High School 2 Sinjai

Adequacy of Facilities and Infrastructure

Interviews with science teachers revealed that the availability of laboratory equipment and materials was considered adequate and highly supportive of the teaching and learning process. The teachers also indicated that the available equipment and materials were highly relevant to the learning topics currently being taught. However, with regard to their condition, the teachers acknowledged that some equipment was damaged and that certain laboratory materials had expired.

According to the teachers, the school had made efforts to replace and update these equipment and materials.

The students' perspectives generally reinforced the positive views expressed by the teachers. The students reported that the availability of equipment and materials in the science laboratory was relatively adequate and aligned with the learning topics being taught. Nevertheless, regarding the condition of these resources, the students also indicated that some equipment and materials were damaged and no longer suitable for use.

Intensity of Laboratory Utilization

The science teachers reported that the science laboratory was frequently utilized and that its use had been formally scheduled to support learning activities. The teachers emphasized that laboratory utilization was conducted in accordance with the established schedule for practical activities.

The students' accounts supported the teachers' statements. The students reported that the science laboratory at State Islamic Junior High School 2 Sinjai was used frequently, even indicating that it was utilized during every science lesson. Furthermore, the students confirmed that an official laboratory schedule was available and visibly displayed in the science laboratory.

Al-Ikhwan Pasir Putih Islamic Junior High School

Interview Results with Science Teachers and Students at Al-Ikhwan Pasir Putih Islamic Junior High School Regarding the Adequacy of Science Laboratory Facilities, Infrastructure, and Utilization.

Adequacy of Facilities and Infrastructure

Based on interviews with science teachers, the condition of the science laboratory facilities and infrastructure at Al-Ikhwan Pasir Putih Islamic Junior High School was considered reasonably adequate. The teachers reported that the available laboratory facilities were sufficient to support the implementation of practical activities. In addition, the existing equipment and materials were considered appropriate for the learning topics currently being taught. However, the teachers acknowledged several issues related to the condition of the laboratory resources. While some equipment remained suitable for use, several items and materials were found to be damaged, no longer fit for use, or past their expiration dates.

Interviews with students at Al-Ikhwan Pasir Putih Islamic Junior High School indicated that the availability of laboratory equipment and materials was relatively adequate. The students also considered the available facilities to be aligned with the learning topics being studied. However,

regarding the condition of these resources, the students reported that several items of equipment and materials were damaged or no longer suitable for use.

Intensity of Laboratory Utilization

The intensity of science laboratory utilization at Al-Ikhwan Pasir Putih Islamic Junior High School was categorized as high, with the laboratory being used 15 times during one semester. Its use was primarily associated with the implementation of practical activities and was adjusted to the instructional content being taught. Nevertheless, the teachers reported that no formal and fixed schedule for laboratory activities had yet been established, and laboratory use was instead determined by the requirements of the learning material.

Students at Al-Ikhwan Pasir Putih Islamic Junior High School expressed a highly positive perception of the intensity of laboratory utilization, reporting that the science laboratory was used frequently and, in some cases, during every science lesson. Furthermore, the students confirmed that an official schedule for practical activities was available and visibly displayed in the science laboratory.

Based on the interview findings from the five schools and madrasahs in Sinjai Borong District, State Islamic Junior High School 2 Sinjai demonstrated the most favorable laboratory conditions, as reflected in the relatively adequate availability of facilities, frequent laboratory utilization, and its status as the only institution with a formal practical schedule. In contrast, Public Junior High School 11 Sinjai and Public Junior High School 39 Sinjai faced the greatest challenges, both in terms of limited laboratory facilities and the very low intensity of laboratory use. Across all five institutions, damaged equipment and expired laboratory materials emerged as common concerns, regardless of the overall level of facility adequacy.

The intensity of laboratory use within a semester varied according to school policies and the instructional requirements of the subject matter. Some schools implemented relatively intensive practical schedules, with up to 15 laboratory sessions conducted in one semester across five different learning topics. In contrast, other schools conducted only approximately two to six practical sessions per semester, depending on the complexity of the learning material and the availability of laboratory equipment and materials. Several teachers nevertheless attempted to maintain practical activities despite limited laboratory resources by using alternative equipment obtained from outside the school or by conducting simple experiments. These findings indicate that laboratory-based learning remained a priority in science instruction despite constraints related to facilities and resources.

Limited availability of laboratory equipment and materials requires students to take turns using the available resources, a situation largely attributed to insufficient school budgets for procuring practical equipment. Such limitations may hinder the development of students' practical

skills and reduce the overall effectiveness of laboratory-based learning. In addition, both teachers and students often face time constraints during practical activities, as each experiment may require considerable time and ideally needs to be completed within a single instructional session. When an experiment cannot be completed within the allotted time, students may experience difficulty interpreting the results, which can impede the development of their science process skills in the laboratory. These conditions highlight the importance of adequate laboratory resources and effective time management to ensure that practical activities are conducted optimally and contribute to the achievement of students' expected competencies (Nikmah, Hartono, & Sujarwata, 2017).

Conclusion

Based on the analysis of data concerning science laboratory facilities, infrastructure, and utilization, several conclusions can be drawn as follows:

1. The condition of science laboratory facilities and infrastructure across the study sites could be classified into two categories: inadequate, as observed at Public Junior High School 11 Sinjai and Public Junior High School 39 Sinjai, and relatively adequate to good, as found at Public Junior High School 36 Sinjai, State Islamic Junior High School 2 Sinjai, and Al-Ikhwan Pasir Putih Islamic Junior High School. Despite variations in the overall adequacy of laboratory facilities, all institutions faced a common problem, namely the presence of damaged equipment and expired laboratory materials.
2. The intensity of science laboratory utilization within a semester varied depending on school policies and the instructional requirements of the learning materials. Some schools implemented relatively intensive practical schedules, with up to 15 laboratory sessions conducted in one semester across five different learning topics. In contrast, other schools conducted only approximately two to six practical sessions per semester, depending on the complexity of the subject matter and the availability of laboratory equipment and materials.

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