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Observation of the Compatibility of Science Laboratory in Junior High Schools in Samarinda

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Abstract

A laboratory is a place with quantitatively and qualitatively complementary and adequate equipment for applying scientific theories, theory testing, certification exams, research, and others. In relation to school education, the science laboratory serves as a place of practical learning in chemistry, biology, and physics that requires special equipment. The purpose of this study was to determine the completeness of the junior high school science laboratory in Samarinda following the criteria of the science laboratory. The method used in this study is qualitative, namely by interview and observation. Based on the survey results, there are differences in the suitability of the places in the two schools; in school A, the suitability of the science laboratory premises meets the existing criteria, and in school B the science laboratory room is still appropriate. However, it does not meet the existing criteria, so it needs to be repaired and added facilities. Given the importance of the science laboratory's function, the laboratory room's suitability needs to be continuously improved.

Keywords: Laboratory; Observation; Qualitative

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INTRODUCTION

Due to the ability to conduct various experiments, laboratory activities also support the implementation of scientific subject learning. In addition, one aspect of assessing the quality assurance of national education is the significance of science education practicums. Junior high schools are also required to have science labs. Government Regulation No. 19 of 2005 regarding National Education Standards Article 42 paragraph (2) and Article 43 paragraph (1) and paragraph (2) stipulate that teaching must have infrastructure, including laboratories, to support the implementation of regular and continuous lessons (PP Nomor 19, 2005).

In the laboratory, research and experiments in science are conducted. The study of the natural sciences (chemistry, physics, and biology) and other sciences. The laboratory is divided into multiple rooms, including a confined room comprised of various sections with their respective functions and open areas, such as gardens, parks, and fields. In addition, another definition of a laboratory describes it as a location where a group of people engages in various research activities, observations, training, and scientific studies as a bridge between theory and practice from various departments (Decaprio, 2013). The laboratory is required as a learning environment to provide students with practical experience, one of the learning's supporting factors, and to allow them to explore their knowledge (Feyzioğlu, 2009).

Science lessons are heavily dependent on laboratory-based practical exercises. Practicum is one of the laboratory activities that contribute significantly to the success of scientific education and learning (Harefa et al., 2021). The management of science laboratories is tailored to the requirements of their users. In order to utilize the laboratory to support the teaching and learning process at school, it must be correctly managed (Harefa et al., 2020).

Laboratory management is a skill that must be possessed in order to maintain the laboratory's governance (Muldayanti & Kurniawan, 2021). Planning, organizing, implementing, supervising, and reporting are the phases of laboratory management (Kusyanti, 2023; Rahmadhani et al., 2023). Science laboratory facilities and infrastructure standards are specified in Permendiknas Number 24 of 2007, namely: (a) The science laboratory room serves as a location for practical science learning activities requiring specialized equipment; (b) the science laboratory room can accommodate at least one study group; and (c) the minimum ratio of science laboratory room area to teaching participants is 2,4. 48 square feet is the minimum laboratory space required for study groups with fewer than 20 students, including storage and preparation space. The minimum width of the science laboratory room is 5 m; (d) The science laboratory room is equipped with adequate lighting for reading books and observing test objects; (e) Clean water is readily available; and (f) The science laboratory room is equipped with the facilities listed in the attachment (Minarti, 2014).

According to the National Education Standards Board (2006), schools must have laboratory infrastructure in addition to furniture and other educational instruments. In order to enhance the quality of science lessons at school, it is necessary to incorporate laboratory equipment and materials. In order to increase efficiency and efficacy, the laboratory must be effectively managed and utilized. The laboratory's use as a learning resource will be enhanced if its users administer it beforehand. The utilization of the laboratory is aided and facilitated by effective management. Management is utilizing human resources effectively and efficiently in administering science laboratories, focusing on the continuity of human resource functions. Planning, organizing, conducting, monitoring, and evaluating are the requirements for efficient laboratory management (Nahdiyaturrahmah et al., 2020).

Given the importance of science laboratories in skill development and learning, effective laboratory management is required to support the laboratory's role and function. According to Mulyono (2015), management is a specialized process of planning, organizing, operating or performing, and controlling or supervising to identify and achieve predetermined objectives by utilizing human and other resources. Good management also produces high quality. In education, quality corresponds to the meaning contained within the learning cycle. Summarizing the concept of quality, we can say the following important phrases: according to standards, according to needs, and according to the global environment (Kartikasari et al., 2021). Therefore, this study aims to observe the compatibility of science laboratories in junior high schools in Samarinda.

METHOD

This study employed a qualitative study, specifically interview and observation techniques. Qualitative research is an approach that involves direct action in the field (Abdussamad, 2022). This study was conducted in November–December 2022. The interview was conducted directly with the chief laboratory manager at the school. Questions with a questionnaire that had been prepared. Then, observations were made by directly surveying the suitability of the tools and rooms in the laboratory. This study aimed to establish the compatibility of the science laboratory at Junior High School A (*Sekolah Menengah Pertama* or SMP A) and Junior High School B (*Sekolah Menengah Pertama* or SMP B) in Samarinda.

RESULTS AND DISCUSSION

Based on the results of observations and interviews, the science laboratory at SMP A was established in 2006; the space is sufficient for one class of students. There is one storage room and one preparation room. Technical practicum in the science laboratory follows the science lesson schedule and the material being taught. It has good lighting, eight lights on and two off; clean water is available, and the science laboratory is in good condition. Generally speaking, a laboratory must be outfitted with safety equipment, such as electrical equipment, to ensure electrical safety. Several

other practicums conducted in science laboratories must also consider practicum safety based on the characteristics of the practicum, not just those involving electrical equipment (Muttaqin et al., 2023). Among the things that must be improved in the science laboratory at SMP A are the following: the number of electrical contacts must be increased so that there is no need to pull cables; chairs must conform to the standard, i.e., they must be at the same height as the laboratory table; and many damaged practical tools must be replaced.

At SMP B, the following observations were made: the science laboratory was established in 1986; the space in the science laboratory is adequate for one class of students. There is one storage room; there is no preparation room. The technical practicum in the science laboratory is conducted in groups. From being divided into activity sheets to preparing tools and materials to practising, the lighting was very inadequate. There were six lights, but only two were on. There was access to potable water, but only one of the five basins was functional. The laboratory's cleansing system was modified to accommodate the lesson plan. Daily, both students and the laboratory coordinator at school B partake in cleaning the laboratory after use. A laboratory assistant's roles and responsibilities include assisting the laboratory coordinator in coordinating and developing laboratory functions for learning and research activities (Elseria, 2016).

In school B's science laboratories, for example, practicum students do not wear lab coats, electricity, and cleaning equipment. However, there are no first-aid supplies, and the fire extinguishers are inoperable. Many of the physics equipment, chemical substances, and human skeletons in SMP B's science laboratories are broken and no longer usable, necessitating the addition of new equipment. In schools A and B, it was evident that some laboratory equipment was still in excellent condition, while others were missing. In addition, information from various laboratory equipment in Samarinda's senior high schools was used to support junior high school instructors' science instruction and learning. In terms of the indicator of the completeness and suitability of laboratory equipment, the results of the study indicate that the completeness of laboratory equipment in high schools in Samarinda is quite complete and following the ideal conditions outlined in Permendikbud No. 8 of 2018 (Wati et al., 2023). Table 1 displays the outcomes of observations regarding the compatibility of SMP A and SMP B.

Table 1 The Observation of Laboratory in SMP A and SMP B

Type	**Standard**	**Compatibility**	
		SMP A	SMP **B**
The science laboratory	Can be filled with at least 1 class of students	compatible	compatible
The Preparation room	Minimum storage and preparation room	compatible	incompatible
The storage building	Minimum storage and preparation room	compatible	compatible
Lighting	Requires sufficient and adequate lighting	compatible	incompatible
Clean water available	Clean water availability	compatible	incompatible

Figure 1 The Science Laboratory in SMP A

Figure 2 The Science Laboratory in SMP B

The facilities and places for storage at SMP A and SMP B are detailed in Table 2.

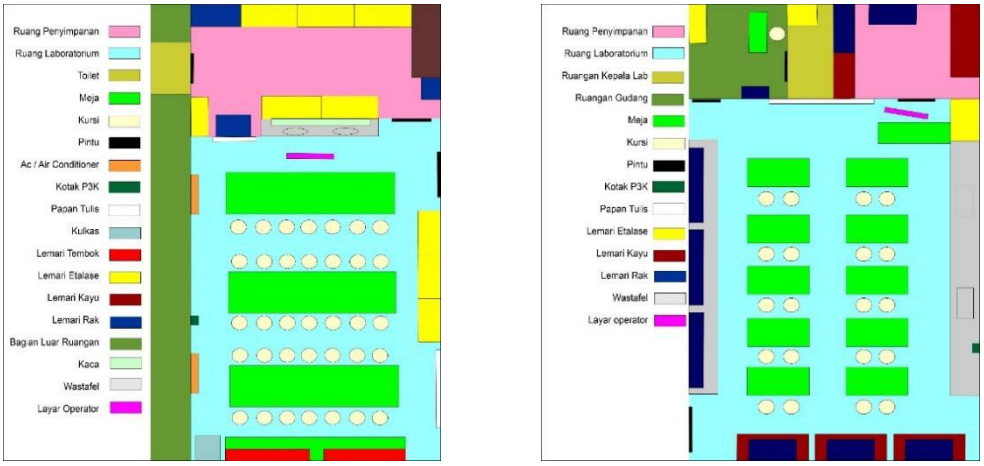
Table 2 Laboratory and Storage Room Facilities at SMP A and SMP B

Facility	Description	
	SMP A	SMP B
Switch	6 pieces	3 pieces
Contact stop	8 pieces	7 pieces
Lights	8 pieces	6 pieces
Wash basin/sink	2 pieces	5 pieces
Faucet	2 pieces	5 pieces
Blackboard	2 pieces	1 piece
Ventilation	12 pieces	20 pieces
Door	1 piece	2 pieces
Fire extinguisher	1 piece	2 pieces
Broom	5 pieces	5 pieces
Trash can	3 pieces	1 piece
Television	-	-
Wall clock	1 piece	1 piece
Wall cupboard	2 pieces	-
Wooden cabinet	1 piece	5 pieces
Showcase cabinet	9 pieces	3 pieces
Shelf cabinet	3 pieces	9 pieces

School A School B

Figure 3 Facilities in SMP A and SMP B

The laboratory plans in SMP A and SMP B are:



SMP A SMP B

Figure 4 Laboratory Design in SMP A and SMP B

SMP A has more facilities than SMP B. Laboratory A has sufficient power outlets for the practicum's electricity requirements. Laboratory A also has wall clocks, blackboards, garbage cans, fire extinguishers, brooms, wall cabinets, display cabinets, and shelf cabinets. This laboratory lacks sufficient lighting and basins to support the teaching and learning process. SMP A has only one entrance and departure door. Due to the abundance of vents, the airflow in this laboratory is excellent. A series of actions to provide, store, protect, and preserve laboratory equipment and supplies (Nulngafan et al., 2020). According to the technical administration of science laboratories, storing equipment and materials must adhere to the principles of being secure, easy to locate, and simple to remove.

SMP B has fewer facilities than SMP A. Laboratory B has sufficient power outlets for the practicum's electricity requirements. In addition to a wall clock, blackboard, trash can, fire extinguisher, broom, display cabinet, and shelf cabinet, Laboratory B is also furnished with a garbage can, broom, and fire extinguisher. The lighting and basins in this laboratory are adequate to facilitate the teaching and learning process. SMP B has only one entrance and departure door. Due to the abundance of vents, air circulation in this laboratory is excellent. The results of the interview at the SMP B science laboratory facilities were once comprehensive; however, the pandemic caused some laboratory equipment to become broken, rusty, etc. Many practicum materials have since expired and are no longer usable. During the pandemic, the primary problem in science laboratories was a dearth of laboratory assistants with the knowledge to manage laboratories properly. This will result in laboratory equipment that is not maintained and cannot function optimally (Zakiyah et al., 2022). According to the observations, the two institutions' rooms' compatibility is distinct. The laboratory is compatible with SMP A, whereas the laboratory remains incompatible with SMP B.

CONCLUSION

Based on the results of research on the compatibility of laboratories at SMP A and SMP B, we can conclude that the laboratory at SMP A complies with laboratory standards. In contrast, there are still incompatibilities at SMP B, such as the absence of a preparation room, inadequate lighting, and a lack of a clean water supply. Since the facilities at SMP A are more substantial than those at SMP B, adding facilities and enhancing the SMP B laboratory is necessary. Given the significance of the science laboratory's function, the room's compatibility must be perpetually enhanced.

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