

Science Laboratory Management in Learning

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Abstract: The science laboratory is one of the facilities and infrastructure in schools that must be well maintained because it is the place where teachers and students carry out science learning activities through practicums. The characteristics of science learning include living and non-living objects, it is abstract, so it is very difficult for students to understand if the learning that takes place does not run optimally and efficiently. Practicum is an inseparable part of science learning subjects. Laboratories are needed as a place of learning to provide real experience to students as a supporting factor in implementing science learning. This research aims to identify and describe planning, management, management, movement, management, and supervision of science laboratories and obstacles in learning carried out by SMP Negeri 34 Palembang with descriptive research using a qualitative approach. The data in this research was obtained through observation, interviews with informants, and documentation as supporting data. This research can be concluded based on the results of the research. The management functions of laboratory management in science learning at SMP Negeri 34 are; The planning and management of the science laboratory has been carried out well, the organization of the management of the science laboratory has a laboratory organizational structure, the organizer of the management of the science laboratory has implemented the work plan well, and supervision of the science laboratory has been carried out by the school principal and supervisor through. Obstacles to implementing science laboratory management in student learning consist of Limited funds, laboratory managers who have multiple jobs, lack of management staff, lack of motivation, and lack of supervision by laboratory staff.

Keywords: Learning, Management, Science Laboratory

A. Introduction

In keeping with societal demands, education has always been the top priority for succeeding generations when examining the historical development of a civilization. In addition to being considered as a way to prepare for the afterlife, education is also thought to be a way to prepare people for the current life they will encounter as they

mature (Syukur, 2013). "Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals and skills that are needed by himself, society, nation, and state," reads the National Education System Law No. 20 of 2003 concerning the National education system.

Humans work to shape their personalities through education to align with societal and cultural norms. As to Hasbullah (2011), the term education or pedagogy refers to the deliberate provision of advice or aid by adults to help them become mature individuals. In this book, adulthood is defined as having the capacity to take care of oneself on a biological, psychological, educational, and sociological level. Education is the basic need of every individual. Because of the importance of education, the government requires 9 years of basic education and recommends more than that. A school institution, cannot be separated from the facilities and infrastructure which are supporting tools or materials in the ongoing teaching and learning process at school.

Of course, sufficient facilities and infrastructure are necessary to support a quality instructional process in educational institutions, both directly and indirectly. The infrastructure of educational institutions has a major role in improving student learning and efficiency. All of the fundamental tools that obliquely assist in carrying out the teaching process in schools are referred to as educational infrastructure (Bafadal, 2013). Facilities including buildings, study spaces, classrooms, instructional material, tables, seats, and so forth are intimately tied to the educational process. In the meanwhile, roads to schools, parks, gardens, and yards are not immediately related. Minister of National Education regulations No.24 of 2007 article 1 contains the standards for school infrastructure and facilities. It states that the minimum requirements for infrastructure and facilities in Minister of National Education regulations No. 24 of 2007 apply to elementary schools/madrasah ibtidaiyah, junior high schools/madrasah tsanawiyah, and high schools/madrasah aliyah. Additionally, it states that an SMP/MTs needs to have the following infrastructure, at the very least: 1. Classrooms, 2. Library rooms, 3. Rooms. science laboratory, 4. Leader's room, 5. Teacher's room, 6. Administration room, 7. Place of worship, 8. Counseling room, 9. UKS room, 10. Student organization room, 11. Latrine, 12. Warehouse, 13. Circulation space, 14. Play/exercise area.

Naturally, effective administration is necessary for all of the aforementioned infrastructural facilities to be kept in good condition and assist the educational process in the classroom. One of the key and most significant resources for assisting the educational process in schools is the infrastructure for instruction. Facilities and infrastructure management is one of the major components that must be managed by a school principal to increase student learning outcomes at school (Muslim, 2019).

This is significant because a fully functional infrastructure facilitates the execution of the teaching and learning process in the classroom, allowing it to work to streamline and accelerate the transfer of knowledge from teachers to students. Complete educational facilities can facilitate the delivery of learning content by teachers, enabling them to raise students' awareness and understanding, which will enhance learning results.

Since science labs are where teachers and students conduct science learning activities during practicums, they are among the school's infrastructure and facilities that need to be kept in good condition. Science is the study of the natural world and its constituent parts. Natural science is one of the courses in schools and is a branch of science where the items are natural objects whose truth has been tested via systematic stages which are also called scientific methods (Purwati, 2012).

Science instruction involves both living and non-living objects and is abstract, making it exceedingly challenging for pupils to understand when learning does not occur optimally and effectively. The teacher must present examples of the content being taught in real-time so that students may more easily understand the continuous learning process and the science lessons being taught. This will make it easier for the students to understand the science lessons being taught. Science courses include a strong emphasis on inquiry learning, which highlights the process of looking for information (Heksa, 2020). Because inquiry learning allows students to engage in scientific process tasks such as observation, description, classification, measurement, experimentation, data analysis, and conclusion, it can aid students in developing a deeper understanding of the natural world (Hisbullah, 2018:8).

A scientific exercise that aids in integrated science learning is called (Wayan, 2020). Practicum is an essential component of science education because science courses necessitate that students grasp concepts they were previously unaware of, which practicum demonstrates. Students will have the chance to foster curiosity and a willingness to try new things, making the material they are taught easier for them to comprehend after conducting laboratory experiments.

According to Indrawan et al., (2020), the primary purpose of the laboratory is to use students' foundational skills to realize current theories and validate content that has been studied in class. Three elements are highlighted in the science learning process: scientific products, scientific processes, and scientific attitudes. This process has unique qualities. It is highly doubtful that these three elements will grow to their full potential if instruction is limited to ordinary classroom settings and does not incorporate laboratory practicums.

Research by Emda (2014) and Usman et al., (2020) supports the above statement, demonstrating that mastery of concepts and subconcepts requiring direct practice in

the laboratory is necessary for the effectiveness of science learning in teaching and learning activities. The study's findings demonstrate that, before using the scientific laboratory, students at SMP Negeri 1 Wangi - Wangi had learning scores that placed them in the low group of the learning outcome category, with a class average score of 52 on the posttest. Student learning outcomes after using the science laboratory obtained an average grade in the class of 78.25 based on the learning outcomes category which was in the high category. There was a positive influence between the use of the science laboratory on student learning outcomes in science subjects after carrying out the t-test and obtained t count or t table $8.33 > 2.042$ and also research conducted Yuliana et al. (2017) states that the use of science laboratories can increase student learning motivation and improve student learning outcomes by 96.91% and 82.70% respectively.

It is evident from the aforementioned studies that students' understanding of science may be expanded and their process skills and problem-solving abilities can be enhanced by applying theory to laboratory activities (practicum). To facilitate the implementation of science learning, laboratories are an essential learning environment that gives students practical experience. It requires laboratory management to operate properly. Waste will result from improper management, which will damage supplies and equipment. In addition, laboratory management is done to make sure the lab's resources are used as effectively and efficiently as possible. The management of laboratories requires skilled human resources. To ensure that teachers have enough time to prepare for and carry out practical learning exercises in the classroom, laboratory personnel or laboratory assistants are very necessary. The management of maintaining the supplies and tools used in school laboratories also requires laboratory assistants. Teachers who utilize the lab in addition to the lab staff are responsible for maintaining the lab's equipment and making sure students are safe while performing practical work there. The user of the laboratory must also make an effort to keep the equipment in working order.

The scientific laboratory building at this school already exists, however, it hasn't been utilized for its intended purpose, according to observations conducted at SMPN 34 Palembang. Experiential and demonstrative science learning activities should take place in the science laboratory. However, other school-related activities use it. This is visible from the laboratory, which is supposed to be a location for hands-on learning but is instead used by the school as a gathering spot. For instance, community health centers can provide health education at formal meetings. is depicted in the picture below.



Figure 1. Official meeting using laboratory space
Source: School Documents, 2016



Figure 2. Health education from community health centers
Source: School Documents, 2016

In addition to being used for school meetings, the laboratory's practical equipment is also poorly maintained, which leads to its rapid breakdown. To properly manage the laboratory, in addition to the laboratory head, there should be laboratory technicians and assistants. In actuality, though, the school lacks technicians, and its laboratory staff is overworked due to their 30-hour science teaching load, which prevents them from performing their duties as laboratory assistants effectively.

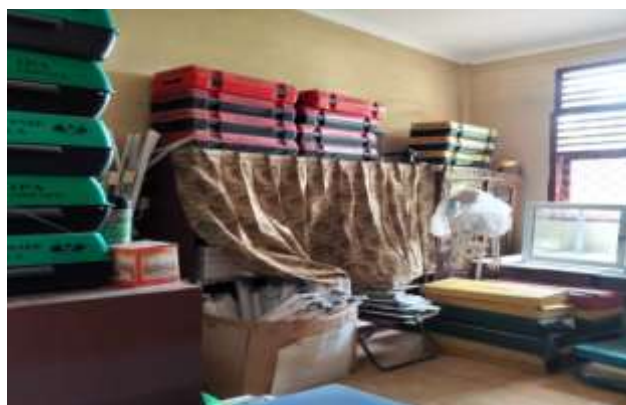


Figure 3. Location of laboratory equipment

Because of this, a proper laboratory management system is required to ensure that the practicum's learning process proceeds smoothly. According to the following definition, "Management of science laboratories in student learning at SMPN 34 Palembang" is a topic that interests scholars to investigate.

Based on the background information provided above, the research's focus—Science Laboratory Management in Student Learning at SMP Negeri 34 Palembang—was established. The sub-focus of this research is: Planning the management of the science laboratory, organizing the management of the science laboratory, actuating the management of the scientific laboratory, and monitoring the management of the science laboratory at SMP Negeri 34 Palembang.

B. Methods

This research was conducted in the laboratory of State Junior High School 34 Palembang. This research includes primary data and secondary data. Primary data in this study. The subjects of this research were school principals, curriculum representatives, facilities and infrastructure representatives, laboratory heads, laboratory assistants, and science teachers. The object is the laboratory of SMP Negeri 34 Palembang. This research is descriptive research using a qualitative approach which is an approach with an in-depth, detailed, and systematic data and information collection process to understand the object of the research study (Yusuf, 2017).

Primary data in this research is data collected from interviews with informants. The informants in collecting data for this research were 1 school principal, 1 curriculum representative, 1 facility and infrastructure representative 1 laboratory head, 1 laboratory assistant, and 1 science teacher. The source of secondary data in this research is documents, namely all documents that support the management of the science laboratory at SMPN 34 Palembang, including the school's vision and mission, laboratory work program documents, laboratory equipment inventory documents, and laboratory use documents. The data in this research was obtained through observation, interviews with informants, and documentation as supporting data.

C. Results and Discussion

1. Science Laboratory Management Planning

In general, science education helps kids grow cognitively and emotionally. in addition to psychomotor, which can happen concurrently. Consequently, the growth of these three domains must be able to be included in science learning plans. To develop the three dimensions, namely cognitive, affective, and psychomotoric.

Learning outside of the classroom must be incorporated into the curriculum to supplement what is learned in the classroom. This can be done through project-based learning or more structured activities like lab experiments or practica.

Since the laboratory provides a place to view, try, and evaluate science or science concepts, it serves as the focal point of science practicum activities (Rasyid & Nasir, 2020). This practicum or experiment helps students grasp natural science (science) more fully. Proper laboratory management is essential to the success of practicums conducted in the lab. Management is merely a tool for achieving objectives. Good management will make it easier to realize the goals desired by the company, employees, and society (Hasibuan, 2014). With management, the effectiveness and results of management elements (man, money, methods, machines, and markets) can be increased. The discussion of management functions in laboratory management, which include organizing, planning, implementing, and supervising, is based on the data and findings of the author's research on science laboratory management in student learning at SMP Negeri 34 Palembang, as previously explained.

It can be concluded from an analysis of the scientific laboratory management planning that researcher looked at that the laboratory management planning is sound. Creating a work program is one of the goals of the natural science management program. The principal, deputy principal, laboratory manager, and science instructors collaborate to carry out the preparation of the laboratory work program at SMP Negeri 34 Palembang, which comprises schedules for laboratory activities. Creating a vision, mission, and goals to serve as guides for the work process is the first step.

To achieve the school's vision, mission, and goals, its full potential – particularly that of its human resources, facilities, and infrastructure – must be realized. To address the demands of teachers and students while purchasing supplies and equipment for scientific labs, the school has also established priority levels. Planning an activity involves determining what needs to be done, why it has to be done, how to do it, who is doing it, when and where to do it, and how much it will cost, (Sardiman, 2011). This laboratory work plan was prepared considering expert comments.

The human resource for laboratory management planning is the laboratory manager, who is directly appointed by the school principal. The principal is a qualified science subject teacher who follows the laboratory head, who is also a science teacher. As a result, the administration of scientific lab personnel continues to align with teaching responsibilities and other tasks. When giving out assignments, the school principal nevertheless takes each teacher's requirements and skills into account. This is carried out to enable effective management.

2. Organizing a Science Laboratory

As Terry states Kurniadin & Machali (2012), organizing is a fundamental task of management. To facilitate the effective and efficient execution of actions aimed at achieving the established goals, organizing is done to gather and arrange all human resources. There are different categories of organizational resources: 1) human resources and 2) Material resources, such as buildings, machinery, land, and infrastructure. According to Angger (2020), organizational resources comprise policies and procedures.

The laboratory organizational structure is set up to organize human resources. The principal of the school and the head of the laboratory have established an organizational structure for the science lab at SMP Negeri 34 Palembang that clearly outlines the division of labor. With this organizational structure, the laboratory's resources are well aware of their roles and the responsibilities they will fulfill. The laboratory also requires an individual in charge of overseeing daily operations. In an organization with a well-defined division of labor and specific tasks, every member can be assigned a specific set of responsibilities.

Activities for managing science lab supplies and equipment are included in the category of science lab infrastructure and facilities. Lab administration is formed inside this infrastructure and facility grouping. Experts state that an inventory of laboratory facilities and equipment makes up the laboratory management system. Infrastructure inventory, which includes a list of names for materials and equipment, the year of purchase or reception, and the quantity and condition of damaged, broken, and used-up equipment, is helpful for quickly locating and retrieving equipment in the laboratory inventory. Administration for borrowing laboratory equipment includes a receipt book or proof of borrowing equipment, a maintenance and maintenance schedule for laboratory equipment, and an administration book for receiving equipment and materials. This school already manages the laboratory, according to the previously described administration; nevertheless, there is no administration for the upkeep and maintenance of the laboratory's equipment. Due to a lack of maintenance management and laboratory professionals, a lot of laboratory equipment is destroyed.

The lack of a laboratory equipment maintenance administration book results in an incomplete laboratory management administration. Equipment maintenance and upkeep are crucial tasks that laboratory managers must complete. The purpose of this activity is to guarantee that laboratory equipment may be utilized within the parameters of its useful life. Cleaning the tools, checking their performance and work results, repairing damaged equipment parts, replacing missing tool parts, storing the tools by the inventory list, verifying their availability, and providing information for tool procurement are just a few of the tasks involved in maintaining

and caring for laboratory equipment (Sani, 2018). Activities in maintenance and maintenance should be scheduled and recorded so that they can provide information about the history of the equipment from purchase, maintenance, and use until the end of its useful life.

A schedule must be created before using the laboratory so that it doesn't conflict with other classes and leaves time for the next practical. The science topic schedule created by the school's deputy principal for curricular affairs serves as the basis for the practicum program at this institution. The laboratory manager is in charge of organizing and storing tools and supplies in the science lab in addition to overseeing the infrastructure and facilities of the lab. Regarding organizational resources, the use of laboratory space is already governed by rules in the laboratories. Every student completing a practicum is required to abide by the guidelines in the laboratory. The science subject supervisor must permit students before they can enter the laboratory. This is to prevent mishaps or the usage of equipment without the laboratory officer's consent. Carrying out practical work in the science laboratory at SMP Negeri 34 is quite safe. This can be seen by the presence of a fire extinguisher and first aid kit.

3. Implementation of the Science Laboratory

An effort is made to implement laboratory work programs using procedures that adhere to the learning tools' learning techniques, practicum schedules, and regulations. The science teacher follows the schedule created by the laboratory manager for the practical activities. However, because of the pandemic, there is less face-to-face instruction, so the science teacher only conducts demonstrations using the materials that are already available. Each instructor prepares and distributes a worksheet for the students to use before the practicum begins. In this report, the students document the outcomes of the work the teacher completed during the practicum. Student worksheet results are evaluated to encourage students to understand the material being taught. The actual activities are completed by the set schedule. Depending on the resources and equipment available in the laboratory, practical activities are not performed every day.

There are preparation tasks that must be completed in the laboratory before beginning practical work. Subject teachers and laboratory officers handle the preparations in the lab. The laboratory staff and the scientific subject instructor at SMP Negeri 34 Palembang arranged the necessary equipment and supplies for the students to perform practical work in the lab, according to an interview with the teacher. The subject teacher cleans the equipment and gives it to the laboratory officer once the practical activities in the lab are over. The equipment borrowed for the practical activity is documented by the officer. The subject teacher returned the

instruments and supplies used after the practicum in a clean state, based on the findings of the interview with the head of the laboratory.

The purpose of data collection through the tool and material receipt book is to enable the laboratory manager to promptly identify instances of unfavorable events, such as material waste and equipment damage, as well as instances in which the use of practical tools and materials is appropriate for the tasks involved in performing practical activities. After practical activity, tools are kept in the storage cabinet. Tool storage appears messy because of this storage cupboard's constraints. The principal of the school does not provide enough motivation for operating the laboratory, such as through rewards. The principal and supervisor of the school provide just the values that serve as incentives. Incentives or prizes can be offered to sustain or enhance a work ethic, spread enthusiasm, and spark interest (Daryanto, 2018).

4. Supervision of the science laboratory

One of the management roles that controls or assesses work related to organizational performance is supervision. An exercise intended to assess planned laboratory activities is called evaluation of laboratory activities. Establishing benchmarks is essential for successful laboratory management. The existence of preparatory work that meets established standards attests to this success. This is consistent with the view expressed by Manullang (2012), who claims that supervision is one of the management functions that involves evaluation and, if necessary, corrections to ensure that subordinates' work is directed correctly to meet previously stated goals. Monitoring depends on the actions taken, namely evaluation actions, and corrective actions taken when necessary to ensure the actions are in line with the plan.

The head of the laboratory oversees the execution of activities by examining the outcomes of the practicum that the students have completed. At specific intervals, the principal of SMP Negeri 34 Palembang assesses laboratory operations. Using the supervisory technique, the principal keeps an eye on and assesses how the principal uses the laboratories for teaching science. Improving the monitoring performance of the laboratory work program is the school's aim in terms of both monitoring and evaluation.

The rise also reflects supervision. This is seen in the degree to which the school implements planned but unrealized improvements. Based on the outcomes of monitoring and assessment, the school can make improvements to this plan. The idea was amended after the head of the laboratory and the teacher gave it some thought. Improvements are also evident in SMP Negeri 34 Palembang's follow-up regarding suggestions and constructive criticism. The administration additionally endeavors to pursue grievances raised by the principal, instructors, parents, and supervisors of the institution.

Supporting aspects in administering the science laboratory at SMP Negeri 34 Palembang include: the school already has a facility for a science laboratory with dimensions of 15 x 8 meters with laboratory infrastructure that conforms with the norms of Permendiknas no. 24 of 2007. Among the challenges in integrating science laboratory administration into the education of students are 1) Limited funds for laboratory management mean that procurement of tools and materials for practicums has not been met; 2) The laboratory manager also has another job as a science subject teacher; 3) There are no technicians in the laboratory as a result, many laboratories equipment are damaged and lack maintenance; 4) lack of motivation provided by the school principal; and 5) Lack of training or courses for laboratory managers and science teachers regarding practical work and use of laboratory equipment.

The science laboratory has been planned correctly, as evidenced by the coordination between the principal, laboratory head, and science teacher in determining the vision, mission, goals, and budget of the science laboratory at the start of the school year together. This information is based on pertinent prior research written by Yores (2021) entitled Science Laboratory Management at SMA Negeri 4 Ogan Komering Ulu in Ogan Komering Ulu.

There is a lab usage schedule, an annual plan, a semester plan, and a vision, mission, and objectives that guide the sequence of activities in the science lab. The implementation of the activity plan is well-structured. Science teachers perform the functions of laboratory assistants because the organizer already has an organizational structure in place but lacks technicians and laboratory assistants to help keep the lab running properly. The laboratory work plan was implemented without any problems. Funds for school operating help are generously donated, which serves as inspiration. Evaluation of laboratory management is accomplished through periodic assessments of the head of the scientific laboratory's extra responsibilities, teacher performance evaluations, and supervision activities. These assessments are completed at the end of each semester. The paucity of laboratory assistants and the scheduling of lab time are challenges in running the scientific laboratory at SMA Negeri 4 Ogan Komering Ulu.

Additionally, a study conducted in 2014 by Senta (2014) concluded that SMP Negeri 80 East Jakarta's scientific laboratory has not yet been subjected to laboratory management implementation, which includes organizing, planning, operating, and managing the facility ideal. It fails to specify the tasks that must be completed to meet the objectives; it has not been well received by all lab users; the science lab's movement and guidance have not been ideal; and it seems that lab assistants are not always present in the lab. The fact that the laboratory conditions are currently subpar indicates that the monitoring and evaluation activities in science laboratories have also not been done adequately.

D. Conclusion

1. The management functions of laboratory management in science learning at 34 state junior high schools, namely;

The science teachers, the head of the laboratory, and the school principal collaborated to determine the vision, mission, and goals of the science laboratory as well as the funds required to manage it at the start of the school year, demonstrating that the planning and preparation for the management of the lab have been done well. -identical A schedule for laboratory use, an annual management activity plan, a semester management activity plan, and a vision, mission, and objectives are all included in the well-structured scientific lab activity plan. However, according to National Education Minister Regulation No. 26 of 2008, which calls for a laboratory head, laboratory assistant, and technician, the human resources (managers) do not yet match the qualifications for laboratory staff. There isn't a laboratory technician at this school.

Putting together (planning) The principal, deputy principal, laboratory head, laboratory assistants, and science teachers make up the scientific laboratory management hierarchy. There is also a distinct task division. There is no administration for the upkeep and maintenance of laboratory equipment, but there is laboratory administration in the form of inventory books (hard copy and soft copy), laboratory use books, books on borrowing and returning laboratory equipment, procurement books, and laboratory materials.

The work plan has been effectively executed by the science laboratory management, and the school has partnered with relevant partners to acquire the necessary tools and supplies. The schedule created by the laboratory head governs the learning activities that take place in the room. Pupils systematically file into the lab and submit a report detailing their practicum experience.

d. Every semester, the principal and supervisor of the school oversee (manage) the scientific lab through the use of teacher performance evaluations and assessments of the head of the lab's extra responsibilities.

2. Obstacles in implementing science laboratory management in student learning consist of:

Limited funds for laboratory management mean that procurement of tools and materials for practicums has not been met. The laboratory manager also has another job as a science subject teacher. The lack of laboratory management staff, namely technicians in the laboratory, results in many laboratories equipment being damaged and lacking maintenance. Lack of motivation provided by the school principal. There is no supervision by laboratory staff when practical activities are carried out.

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