Description of Science Laboratory Management in State Junior High Schools in Makassar City, Indonesia

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Abstract. This study aims to describe the management of science laboratories in public junior high schools in Makassar City in the aspects of planning, implementation and evaluation. The population in this study was public junior high schools in Makassar city while the sample was the science laboratory room in 4 schools in Makassar city, including SMPN 1 Makassar, SMPN 8 Makassar, SMPN 12 Makassar, and SMPN 24 Makassar. This research is a quantitative research with survey research type. The research instruments were in the form of observation sheets and questionnaires to find out whether the school uses or manages the school laboratory well. The measurement scale that will be used in this study to determine the answer score of the respondents is using likert Scale. The data were analyzed by descriptive statistical analysis and percentage categories as a whole and per indicator. Descriptive statistical analysis aims to determine the percentage level of laboratory management indicators. The results of the study obtained science laboratory management in public junior high schools in Makassar City on planning indicators are in the good category with a percentage of 82.47%, implementation indicators with a percentage of 79.31% with a good category, and evaluation indicators with a percentage of 74.11% with a good category.

Keywords: Science Laboratory Management, Planning, Implementation, Evaluation.

1 Introduction

Science learning involves practicum as an important activity to develop process skills and application of theory. Practicum helps students understand the theory more deeply, stated that practicum can stimulate the urge to learn science, develop basic experimental skills, and support scientific learning. To support practicum activities, special facilities are needed, namely laboratories [1].

Learning activities that accommodate various types of student intelligence are often those conducted in laboratories or through practical experiments. According to a study, laboratory activities aim to teach students process skills in the laboratory and understand concepts through practice. Practical activities play a crucial role in science education as they enhance students' skills in conducting hands-on experiments and working directly in the laboratory [2].

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Science teachers aiming to use the laboratory as a learning approach can achieve success and efficiency in its management only if they possess a solid understanding of fundamental laboratory management principles. Organizing and managing laboratories is the most difficult and challenging aspect of science teaching [3]. Teachers need to address the various science laboratory environments involved such as the appearance of learners in the laboratory, how skilled laboratory assistants should make it easier for teachers to teach during practicals, types of laboratory activities, adequate laboratory equipment and medical supplies, safety and liability features in the laboratory setting, sufficient time for learner investigations and laboratory infrastructure [4].

The ideal situation for schools is to have laboratories that meet the standards set by Government Regulation of the Republic of Indonesia Number 32 of 2013, which amends Regulation Number 19 of 2005 regarding National Education Standards. The regulation specifies a minimum ratio of laboratory equipment to the number of learners. However, there is a discrepancy in implementing science laboratories, particularly concerning the ratio of students to available laboratory equipment [5].

The use of laboratory management as a learning resource is a form of awareness in utilizing facilities at school. However, to facilitate teachers and students in using the laboratory as a learning resource, of course, it must be managed properly. Good laboratory management is expected to be able to meet the needs of students as a means of learning resources to understand learning materials. Laboratory management is the process of utilizing resources effectively and efficiently to achieve a certain goal. Effective laboratory management must meet the criteria of planning, implementation, and evaluation [6].

Careful planning includes all aspects that will be implemented, such as the existence of a laboratory room, the completeness of the model or teaching aids, and the completeness of practicum tools and materials. Implementation in laboratory management includes the effectiveness of using the laboratory, work safety, carrying out the rules, and also the procurement of tools and materials [7]. The effectiveness of laboratory management evaluation lies in assessing the implementation of the laboratory work program, supported by follow-up actions based on the evaluation results. This process helps prevent deviations from the established programs while ensuring their relevance and effectiveness. [8].

One of the inhibiting factors in the ability of students is the low utilization of science laboratories. So that the Science Laboratory must always be in a ready-to-use condition, the existence of facilities or media in it must also be in good condition and equipped with various effective administrations [5]. Some schools have done laboratory management well, for example, such as the existence of a person in charge of the laboratory, placing tools and materials in their place. In the implementation regarding the use of the laboratory, there is data on laboratory rules, there is a structure of the person in charge of the laboratory. In addition, there is also the management of tools and materials, the placement of tools and materials is in accordance with laboratory criteria by being stored separately or classified so that later it is easy to find when we need it [9].

Laboratory management refers to efforts aimed at ensuring effective governance within the laboratory. Successful laboratory management depends on various interrelated factors. Even advanced laboratory equipment and skilled professional staff may

fail to function optimally without proper management practices. Therefore, laboratory management plays an integral role in supporting all laboratory activities. [10].

Based on this statement, a study was conducted to qualitatively describe the management of science laboratories in several Public Junior High Schools (SMPN) in Makassar City, including SMPN 1 Makassar, SMPN 8 Makassar, SMPN 21 Makassar, and SMPN 24 Makassar based on laboratory management standards.

2 Methods

This research is a qualitative descriptive research. In relation to laboratory management, this study aims to provide an overview of science laboratory management in public junior high schools in Makassar City. The research instrument consists of an observation sheet and a questionnaire or questionnaire to determine laboratory management on 3 indicators, namely planning, implementation, and evaluation indicators. Observation was carried out by researchers by collecting data by directly observing the object of research and giving value to the object. While the questionnaire used is a closed type, which consists of questions with answer choices that have been provided. Respondents consisted of school principals, science laboratory heads, science teachers, laboratory assistants, and students. The measurement scale used in this study to determine the answer score is using the Likert Scale. The data analysis technique employed in this study is descriptive statistical analysis, which is utilized to calculate the percentage for each category [11].

$$P = f/n \times 100$$

Description:
P: Percentage
f: Total frequency of each answer chosen
n: number of subjects in a particular category

3 Result and Discussion

3.1 Result

The results of the categorization analysis of the percentage of science laboratory management for each indicator with percent intervals can be seen in Table 1 as follows.

Table 1. Results of Category Analysis of Science Laboratory Management for Each Indicator.

School	Percentage			Average	Category
	Planning (%)	Implementation (%)	Evaluation (%)		
SMPN 1 Makassar	95.00	89.93	95.93	93.62	Very Good
SMPN 8 Makassar	89.35	81.92	77.22	82.83	Good
SMPN 12 Makassar	74.33	74.33	69.21	73.67	Good
SMPN 24 Makassar	71.21	71.21	54.07	64.40	Simply

Average	82.47	79.31	74.11	78.63	Good

Table 1 shows the results of the analysis of planning, implementation, and evaluation indicators in each school. Overall, SMPN 1 Makassar had the highest percentage of laboratory management at 93.62% with a very good category. Furthermore, SMPN 8 Makassar was in the good category with a percentage of 82.83%. SMPN 12 Makassar was also in the good category with a percentage of 73.67%. SMPN 24 Makassar had the lowest percentage at 64.40% in the moderate category

Based on Table 1, the average percentage of science laboratory management indicators for each school is described (see Fig 1).

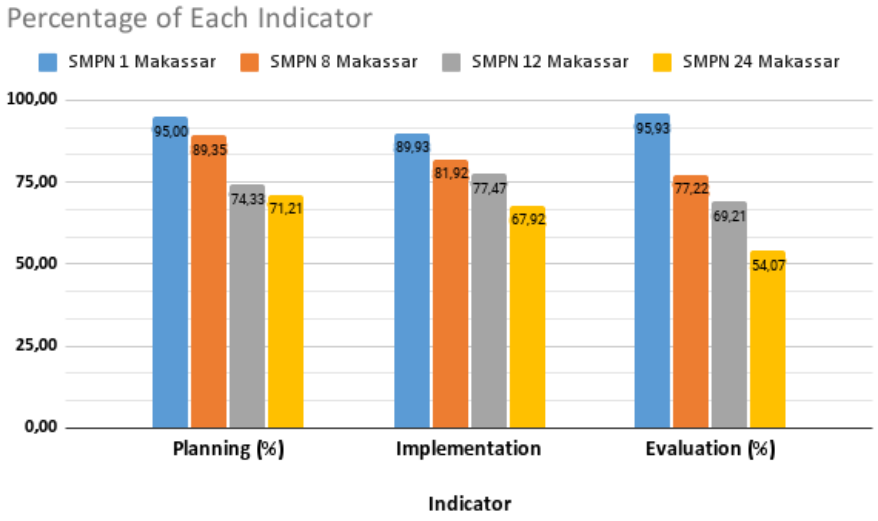

Fig. 1. Percentage chart of laboratory management indicators for each school.

Based on Fig. 1, shows the average percentage of each indicator as a whole. Where the planning indicator has the highest average percentage of 82.47% with a good category. Furthermore, the implementation indicator has an average percentage of 79.31% with a good category and the average percentage of the evaluation indicator is 74.11% with a good category. Overall, the average percentage of science laboratory management in public junior high schools in Makassar City is 78.63% in the good category. Overall, the average percentage of science laboratory management in public junior high schools in Makassar city per indicator can be depicted in the following diagram (see Fig. 2).

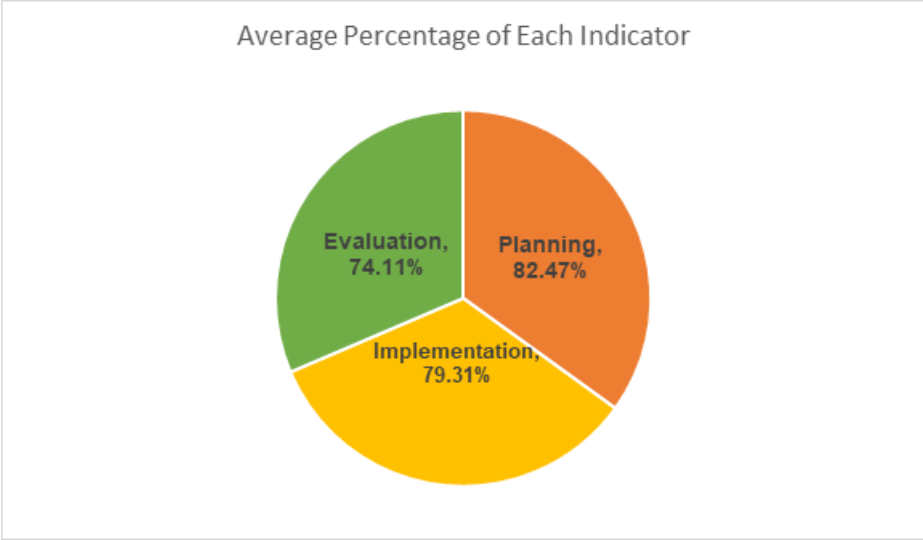

Fig. 2. Percentage Diagram of Overall Laboratory Management Indicators

3.2 Discussion

This study evaluates the management of science laboratories in several junior high schools (SMP) in Makassar City based on indicators of planning, implementation, and evaluation. The results of the research on science laboratory management in public junior high schools in Makassar City for each indicator are described as follows.

Science Laboratory Planning. The observation and questionnaire results indicate that the science laboratory planning at SMPN 1 Makassar falls into the "very good" category, achieving a percentage score of 95%. This school has a structured and effective planning system, including laboratory work programs, laboratory practicum schedules, practicum guides, as well as an adequate organizational structure and Cost Allocation Plan (RAB) for the procurement of laboratory equipment and materials. The tools are also well managed and have been inventoried, accompanied by clear Standard Operating Procedures (SOPs) related to the use of tools and safety from hazards. SMPN 8 Makassar also received a very good category with a percentage of 89.35%. This school has a well-planned laboratory work program and practicum schedule, as well as clear SOPs for practicum and tool use. However, there are still shortcomings in the grouping of tools in the storage cabinet, although overall laboratory management in this school is quite good.

SMPN 12 Makassar is in the good category with a percentage of 74.33%. This school consistently implements several important elements, such as the creation of laboratory work programs, practicum schedules, and a clear organizational structure. SOPs for the practicum process still need to be implemented consistently, which indicates the need for improvement in the implementation of operational procedures to be more directed and safe. SMPN 24 Makassar received a good category with a percentage of 71.21%.

The laboratory has a practicum schedule and SOP for the use of equipment. The practicum schedule is not always carried out regularly, therefore, the implementation of the laboratory work program is considered to still need to be done effectively.

Overall, the average science laboratory management planning indicator gets a percentage of 82.47%, which is in the good category. This shows that laboratory management planning in schools in Makassar has been carried out well, especially in terms of designing work programs, preparing schedules, and managing practicum tools and materials. This research emphasizes the importance of good planning to ensure the effectiveness and success of laboratory management. Laboratory management that is carried out effectively certainly comes from planning that is well organized and structured.

Science Laboratory Implementation. Laboratory management on implementation indicators includes operational activities carried out to carry out laboratory work programs in accordance with the plans that have been made. Based on the results of the study, at SMPN 1 Makassar, laboratory implementation was categorized as very good with a percentage of 89.93%. Practicum implementation is carried out according to schedule, and teachers always guide students well during practicum. For science subjects, practicum is always carried out in the laboratory, this is also seen from the existence of a practicum implementation journal book. During the practicum, learners follow instructions systematically and use tools efficiently. After the practicum, learners clean the tools and work area, even though they do not wear laboratory coats. The laboratory has adequate facilities, such as strong tables and chairs, lighting, and good air circulation, thus supporting the learning process. The results showed that the implementation indicators obtained a very good category, this means that the laboratory has been utilized very well.

SMPN 8 Makassar also received a good category with a percentage of 81.92%. Practical implementation according to schedule, and the teacher guides students during the practicum process. Students carry out work steps fully, systematically, and carefully take into account time, this is in accordance with the results of observations that there are LKPDs that are used as a guide for students to do practicum, and the practicum that is carried out utilizes the facilities available at the laboratory SMPN 8 Makassar. Furthermore, SMPN 12 Makassar was in the good category with a percentage of 77.47%. Practicum is carried out on a scheduled basis, and teachers provide adequate guidance. Students comply with safety procedures by washing their hands after practicum and following instructions in the use of tools. Laboratory facilities, such as clean water and good lighting, support practicum activities, although the lack of stability of tables and chairs is sometimes still an obstacle.

The results of research on indicators of the implementation of the science laboratory of SMPN 24 Makassar obtained 67.92% in the good category. Practical activities are carried out with guidance from the teacher. SMPN 24 does not have a laboratory assistant so that the implementation of practicum in the laboratory is organized and managed by science teachers with coordination by the laboratory head. Although there are shortcomings in the frequency of implementation, science laboratories are still used as needed. Overall, the implementation of science laboratory management in these four schools has an average percentage of 79.31%, which is included in the good category.

Practical activities are generally carried out according to schedule, although two schools, SMPN 24 and SMPN 8, do not yet have laboratory assistants, so the laboratories are managed by science teachers and laboratory heads. The practicum implementation process includes the preparation of tools and materials by subject teachers and laboratory assistants, as well as guidance during the practicum. Laboratory facilities are adequate with good lighting and optimal air circulation, although students do not use laboratory coats. However, safety procedures are still applied as directed by the teacher.

The implementation of laboratory management involves effective use, work safety, fulfillment of rules, and procurement of tools and materials. Laboratory managers must provide tools and materials according to teacher requests, check the condition of the tools, and store tools based on the type of material [8]. High discipline from all laboratory users is needed to realize optimal work efficiency, as well as good cooperation to overcome any difficulties that arise during laboratory activities [9].

Science Laboratory Evaluation. Evaluation of science laboratory management in several junior high schools in Makassar showed differences in the application of monitoring and supervision of laboratories. In SMPN 1 Makassar, evaluation is carried out consistently with a percentage of 95.93% which is categorized as very good. The routine practicum process is evaluated with an accountability report prepared by the laboratory assistant and the head of the laboratory. This report includes the management of tools, budgets, and the implementation of activities in the laboratory, which allows monitoring to run optimally. Science teachers also develop assessment instruments for students in laboratory practicum activities. At SMPN 8 Makassar, laboratory evaluation is in good category with a percentage of 77.22%. The practicum is carried out effectively although the evaluation system has not been implemented optimally. Evaluation is more often carried out at the beginning of the semester to prepare the submission of the necessary tools and materials. However, evaluation needs to be done more optimally so that the results of laboratory management are more measurable [12].

Evaluation Management of the Science Laboratory SMPN 12 Makassar has an evaluation percentage of 69.21% with a good category. The process of evaluating science laboratories is well done, but regular and systematic reports are still a challenge. Evaluations are not always carried out consistently, and technical reports are often only done occasionally. Regular and comprehensive reports are very important to ensure that laboratory equipment, materials, and facilities are maintained in good condition, and to facilitate future laboratory development planning. SMPN 24 Makassar has the lowest percentage, which is 54.07% with a sufficient category. Laboratory evaluation in this school is not carried out optimally because there is no laboratory assistant responsible for laboratory monitoring. The entire burden of evaluation is delegated to the head of the laboratory, which causes the implementation of evaluation to be less effective.

Overall, the average percentage of science laboratory evaluation in these four schools is 74.11% with a good category. Although some schools have carried out evaluations according to procedures, there are still schools that have not conducted reports regularly and optimally. Consistent supervision and monitoring are very important to ensure that science laboratories can support the learning process well. Monitoring allows early detection of problems or irregularities that occur in the laboratory so that

corrective action can be taken immediately to maintain laboratory efficiency and safety [13]. Good supervision reflects the joint efforts of all school components in improving laboratory performance and the quality of science practicum learning.

4 Conclusions and Suggestions

The research findings reveal that the management of science laboratories in public junior high schools in Makassar City is categorized as good across various indicators. The planning indicator achieved a percentage of 82.47%, the implementation indicator scored 79.31%, and the evaluation indicator reached 74.11%, all within the good category.

In connection with the results obtained in this study, the authors propose suggestions, namely to the school to improve the management of science laboratories as well as possible, both in terms of planning, implementation, and supervision of science laboratories.

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