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Laboratory Management from the Perspective of Principals, Science Teachers and Learners at UPT SPF SMP Negeri 27 Makassar

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Abstract: This study aims to describe: 1) laboratory management from the perspective of school principals 2) laboratory management from the perspective of science teachers 3) laboratory management from the perspective of students. The research method of research used is the survey method. The study population was all people in UPT SPF SMPN 24 Makassar. The sampling technique used was random sampling, using the slovin formula with a sample of 120 students, sampling teachers and principals using saturated sampling techniques. Data collection techniques using questionnaires. Data analysis techniques using descriptive statistics. The results showed that: 1) laboratory management in terms of the principal's perspective on the evaluation aspect, the majority chose the answer "Always" as much as 66.7%, 2) laboratory management in terms of the perspective of science teachers in the planning aspect, the majority chose the answer "Always" as much as 51.5%, the implementation aspect, the majority chose the answer "Often" as much as 35.29%, and the evaluation aspect, the majority chose the answer "Rarely" as much as 40.74%, 3) laboratory management in terms of the perspective of students in the implementation aspect, the majority chose the answer "Always" as much as 27.06% in UPT SPF SMPN 27 Makassar

Keywords: Laboratory Management Reviewed from Head; Teacher science; Students

Introduction

Science learning is not only limited to theoretical knowledge, concrete concepts, concrete facts, concepts, facts or principles, but students also need learning that emphasizes direct experience (Ismiyanti et al., 2021; Verawati et al., 2022). One of the skills that science teachers must have is the ability to manage school laboratories (Rosidin et al., 2020).

According to Musdalifa & Faridah Faridah (2021), the laboratory is a place where experiments, scientific research, measurements, and scientific training are carried out. Susilo & Amirullah (2018) argue that the laboratory is one of the facilities and infrastructure that support teaching and learning activities at school.

Laboratories provide opportunities for students as a place to arouse their curiosity and willingness to better understand and deepen the discoveries obtained from experiments. Therefore, a good laboratory management system is needed to support practicum activities (Carin (2005: 15); Sudirman, 2011: 57).

Therefore, science laboratories must always be in a ready-to-use condition, the facilities and media in it must also be well maintained and equipped with various effective management functions. The ideal requirement is that schools have laboratories that meet the standards of Government Regulation of the Republic of Indonesia Number 32 (2013) concerning Amendments to Government Regulation Number 19 of 2005 concerning National Education Standards in terms of criteria regarding the number of students and equipment provided. Article 43 (2) stipulates that laboratory equipment must be organized with a

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minimum ratio of equipment per student. The ratio of students to available laboratory equipment is important in organizing science laboratories (Nulngafan, 2020).

All laboratories in schools must have good laboratory management so that practicum learning can run smoothly. The success of laboratory management depends on several interrelated factors. Some sophisticated laboratory equipment and qualified human resources cannot function properly without proper support through laboratory management. Knowledge of how to use laboratory equipment and materials is essential to support the learning process. An issue that often arises in laboratory research is the quality of laboratory management, including the process of procurement, use, and maintenance of equipment and materials.

According to Suranto (2020: 89), the management process consists of several processes, namely planning, organizing, and evaluating. An agency cannot manage without a plan. In addition, if a plan is not implemented properly, it cannot be said to be managed properly. The same applies to organizations and management. Based on this concept, management must be managed well. This means that activity plans must be developed, structured and organized systematically, and activities must be implemented based on careful planning and continuous quality control.

Running a laboratory requires a dedicated organization or staff. According to the Regulation of the Minister of National Education No. 26/2008 on Laboratory Staff Standards, a laboratory consists of a laboratory head, technicians, and laboratory assistants. These three employees each have their own qualifications. If the laboratory qualification criteria are met, then the use or management of the laboratory will be effective and efficient.

Based on the results of preliminary observations, it was found that SMP Negeri 27 Makassar still did not meet good inspection standards. For example, there are no inspection officers, no technicians, tools and materials are not well organized, and management is not maximized. However, it can be said that this laboratory is good enough, because it has complete equipment and teaching materials, and meets the needs of students such as practicum.

Based on the results of these observations, a study will be conducted that aims to quantitatively describe the management of science laboratories at UPT SPF SMP Negri 27 Makassar based on correct laboratory management standards. UPT SPF SMP Negri 27 Makassar is one of the A accredited junior high schools in Makassar City. Therefore, researchers chose this location because it was considered suitable and strategic for conducting research.

Method

The type of research in this proposal is descriptive research with a quantitative approach using a questionnaire as a data collection tool. The sample of this study was the head of the laboratory and subject teachers as well as students of class VIII and class IX UPT SPF SMP Negeri 27 Makassar, totaling 117 people.

Determination of student samples using the Slovin formula, as follows:

$$n = \frac{N}{Nd^2+1} \text{ …….. (1)}$$

Description:
n = Number of samples
N = Total population
d = Deviation rate (0.2)

Analysis method to determine the percentage score of each aspect of laboratory management is:

$$P = \frac{f}{n \times 100\%} \text{ …… (2)}$$

Description:
P = Laboratory Management Score
f = Number of scores
n = Ideal score
100% = Constant

The research procedure that must be carried out by researchers in research begins with the preparation stage, which is divided into making a research permit, preparing a research proposal, developing research instruments, and validating research instruments on experts. Then proceed to the implementation stage, namely the researcher meets the principal to ask permission and provide an explanation to the respondents in this case: the principal, head of the laboratory, teachers and students to fill out the questionnaire to be given. Until finally at the final stage, namely collecting and processing data, scoring the answers that have been given, and making discussions and conclusions.

Result and Discussion

This research is a quantitative research of survey type. This research was conducted at UPT SPF SMP Negeri 1 Makassar and UPT SPF SMP Negeri 21 Makassar on August 14 to October 15, 2024. Below is research data on scientific laboratory management. This data was obtained from the results of a questionnaire at UPT SPF SMP Negeri 27 Makassar.

1. Description of Science Laboratory Management Categories According to the Principal

Table 1. Principal Questionnaire Analysis Results

Indicator	Percentage (%)				
	Always	Often	Sometimes	Rarely	Never
Evaluation	66,7	33,3	0	0	0

Based on Table 1, the questionnaire analysis is obtained from the perspective of the school principal. In the evaluation indicator, the majority of answers are the "Always" option, which is 66.7%.

According to the principal, technical reports on equipment, budget utilization and science laboratory management reports are "always" made and reported. The effectiveness of the practicum process is also always carried out in the laboratory. Evaluation and supervision activities tend to be carried out frequently during practicum. However, the development of science process assessment is only sometimes carried out by teachers.

Table 2. Science Teacher Questionnaire Analysis Results

Indicator	Percentage (%)				
	Always	Often	ometime:	Rarely	Never
Planning	54,54	36,36	4,54	4,54	0
Implementation	85,29	8,82	5,88	0	0
Evaluation	69,44	22,22	8,33	0	0

Based on Table 2, obtained questionnaire analysis according to the perspective of science teachers. In the planning indicator, the majority of answers are the "Always" option, which is 54,54%. In the implementation indicator, the majority of answers are the "Always" option, which is 85.29%. In the evaluation indicator, the majority of answers are the "Always" option, which is as much as 69,44 %.

According to the science teacher in the planning process, the storage of tools and materials classified by group is "always" implemented by the laboratory. Tools and materials are also always equipped with labels, and dangerous equipment is always stored in a special place. However, schools tend to "rarely" compile practicum guides. In the implementation process, according to science teachers, the practicum guidance process is "always" carried out. The laboratory is "always" in good lighting conditions, constantly running water, and cleaned on a scheduled basis.

Table 3. Students Questionnaire Analysis Results

Indicator	Percentage (%)				
	Always	Often	Sometimes	Rarely	Never
Implementation	24,31	14,23	`16,43	13,89	31,11

Based on Table 3, obtained questionnaire analysis according to the perspective of students. In the implementation indicator, the majority of answers are the "Always" option, which is 24,31%.

Based on the survey results of the UPT SPF SMP Negeri 27 science laboratory plan, the school does not yet have a laboratory work program, cost allocation plan (RAB), and science practice plan. Based on observations, UPT SPF SMP Negeri 27 Makassar has LKPD as a guideline for implementing scientific practices on several materials and there is no standard operating procedure (SOP) for the practice process and hazard prevention. It appears that the organizational structure has not been well formed and the position of laboratory assistant is filled by a science teacher. Tools and materials used in practical work are not organized and grouped clearly based on the material or type of material in the pantry. The arrangement of tools in the cupboard looks unnatural because there are only a few storage cabinets to store these tools.

However, not all laboratory equipment has a sign, and there are no instructions for using the equipment. Furthermore, as an indicator of the status of the implementation of science laboratories, it is known that although there is no practice plan, the implementation is not as planned.

On the other hand, the laboratory lacks adequate lighting, stable chairs and tables, and available clean water facilities. The laboratory will also be cleaned regularly. Teachers will make a rotating cleaning schedule for each class. UPT SPF SMP Negeri 27 Evaluation of science laboratories in Makassar is submitted by the laboratory director to the director in the form of a written report for the first semester practical activities. However, the monitoring and evaluation process is not yet optimal and there is no laboratory financial report.

Questionnaire analysis of planning indicators. In the planning indicator, which has been filled in by the head of the laboratory and science teacher. Where in the planning stage, there are 11 questionnaire statements. The following is a recapitulation of the UPT SPF SMPN 27 Makassar planning questionnaire.

Table. 4 Recapitulation of the Planning Questionnaire UPT SPF SMPN 27 Makassar

NO	STATEMENT	PERCENTAGE				
		AL	OF	SO	RA	NE
1	The school designs a science laboratory work program	36	67	0	0	0
2	The school makes a science practicum schedule	67	33	0	0	0
3	The school makes a Cost Allocation Plan (RAB) for the science laboratory	67	33	0	0	0
4	Schools prepare practical guides	0	17	0	83	0
5	The laboratory has a Standard Operating Procedure (SOP) for the practical process.	83	17	0	0	0
6	The laboratory has a Standard Operating Procedure (SOP) for the use of equipment.	83	17	0	0	0
7	The laboratory has a Standard Operating Procedure (SOP) for safety against hazards.	50	50	0	0	0
8	The laboratory has an organizational structure	100	0	0	0	0
9	Tools and materials in the laboratory are equipped with labels	100	0	0	0	0
10	Storage of tools and materials is classified according to their groups	100	0	0	0	0
11	Dangerous laboratory equipment is stored in a special place	100	0	0	0	0
	Average	71.4	21,2	0	7,5	0

The results above are in accordance with the questionnaire that has been filled in by the head of the laboratory and science teachers. Referring to the contents of the questionnaire, 71,45% of respondents' answers were "Always". However, there is a difference in point 8, namely the laboratory has an organizational structure. As many as 100% of respondents chose "Always", Likewise with point 11 regarding the storage of hazardous equipment and materials where 100% of respondents chose "Always".

Questionnaire analysis of implementation indicators there are 17 questionnaire statements. Here is one of the scoring rubrics for the implementation category. The following is a recapitulation of the questionnaire for the implementation of UPT SPF SMPN 27 Makassar.

Table. 5 Recapitulation of the Implementation Questionnaire of UPT SPF SMPN 27 Makassar

NO	STATEMENT	PERCENTAGE				
		AL	OF	SO	RA	NE
1	Schools carry out practical activities on a scheduled basis	8.5	6.7	23	10	18
2	Teachers carry out guidance activities during practical work	11	10	19	8.5	18
3	Students wash their hands properly after completing the practical work.	15	9.8	6.7	13	22
4	Students carry out the practical work steps in full, systematically, and carefully calculate the time.	13	13	16	8.5	16
5	Students enter the laboratory wearing lab coats	6.1	4.9	4.9	6.7	44
6	The practicums carried out utilize the available practicum facilities.	12	7.9	13	12	22
7	Students use tools according to instructions	16	13	9.1	6.7	21
8	Students use practical materials according to the measurements efficiently	12	5.5	13	13	23
9	Students carry out sterilization of tools using a spirit lamp correctly	9.1	11	11	10	25
10	There is a warning symbol for dangerous chemicals	15	9.1	10	9.1	23
11	The laboratory space has good lighting.	22	8.5	9.8	9.8	16
12	The laboratory room has clean water facilities	21	9.8	13	6.1	17
13	The laboratory has strong and stable chairs and tables.	26	13	12	3.7	12
14	Students clean tools and materials properly	20	9.1	8.5	10	19

NO	STATEMENT	PERCENTAGE				
		AL	OF	SO	RA	NE
15	Students clean the lab table after the lab	20	7.9	14	5.5	19
16	The laboratory is cleaned on a scheduled basis	21	6.7	9.8	9.1	20
17	There is use of laboratories in educational research or learning in laboratories by external parties.	15	7.9	16	8.5	19
	Average	15.4	9.1	12.2	8.8	20.8

The results above are in accordance with the questionnaire that has been filled in by the head of the laboratory, science teachers, and students. Referring to the contents of the questionnaire, as many as 15,45% of respondents' answers were "Always". However, there are differences in point 1, namely the practicum implementation schedule. As many as 8,5% of respondents chose "Sometimes".

The science laboratory at SMPN 27 Makassar is used by science teachers in demonstrating media in learning. Science teachers often conduct lessons in the laboratory room, but do not carry out practicum. Practical activities have not been able to run according to the schedule and plan. Based on interviews with several students, giving answers that the last time they did practicum was in class VII. In addition, the position of laboratory assistant is filled by science subject teachers.

Analysis of the questionnaire evaluation indicator there are 9 observation sheet statements. The following is a recapitulation of the questionnaire for the implementation of UPT SPF SMPN 27 Makassar.

Table. 6 Recapitulation of Questionnaire Implementation of UPT SPF SMPN 27 Makassar.

NO	STATEMENT	PERCENTAGE				
		AL	OF	SO	RA	NE
1	The effectiveness of the practical process in the laboratory is well measured	100	0	17	0	0
2	Teachers develop science process assessments in the laboratory	17	0	83	17	0
3	Laboratory Standard Operating Procedure (SOP) implemented	67	50	0	0	0
4	Evaluation of the implementation of the practicum was carried out	83	33	0	0	0
5	Practical supervision activities were carried out	83	17	0	17	0
6	There is a technical report on tools and materials by the laboratory assistant to the head of the laboratory.	17	17	50	33	0
7	There is a laboratory management report by the laboratory head to the principal	50	17	50	0	0
8	There are reports on budget utilization that are made in a transparent and accountable manner.	100	17	0	0	0
9	Use of laboratory costs in accordance with the Cost Allocation Plan (RAB)	100	0	0	17	0
	Average	68,5	16,7	22,2	9,3	0

The results above are in accordance with the questionnaire that has been filled in by the head of the laboratory, and science teachers. Referring to the contents of the questionnaire, as many as 68,55% of respondents' answers were "Always". However, there is a difference at point 7, namely the laboratory management report by the laboratory head to the principal. As many as 68,55% of respondents chose "Always".

Conclusion

Based on the results of the research that has been carried out, it can be concluded that the management of science laboratories in UPT SPF SMP Negeri 27 Makassar in terms of: 1). The principal's perspective, namely the implementation indicator with a percentage answer of Always 66.7%, often 33.3%, sometimes 0% rarely 0%, and never 0%; 2). The teacher's perspective, namely (i) planning with a percentage answer of Always 55.54%, often 36.36%, sometimes 4.54% rarely 4.54%, and never 0%, (ii) implementation with a percentage answer of Always 85.29%, often 8.83%, sometimes 5.88% rarely 0%, and never 0%, (iii) evaluation with a percentage answer of Always 69.44%, often 22.22%, sometimes 8.33% rarely 0%, and never 0%; 3). Students'

perspectives, namely the implementation indicator with a percentage of answers of Always 24.31%, often 14.23%, sometimes 16.43% rarely 13.89%, and never 31.11%; 4). Laboratory management at SMPN 27 Makassar faces a number of obstacles, including the absence of a clear work program, RAB, and SOP. The organizational structure has not been well established, and the position of laboratory assistant is filled by a science teacher. Practical tools and materials are not neatly organized, and laboratory facilities such as lighting, tables, chairs, and clean water are limited. Practicum has also not been carried out according to plan.

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