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Study of Completeness and Utilization of Biology Laboratories as Supporting Biology Learning Activities of State Madrasah Aliyah (MAN) in Sleman Regency

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Abstract: The laboratory is one of the learning infrastructure that can be used to conduct practicum, research, and to improve skills in conducting scientific experiments. This study aims to determine the level of completeness and usefulness of biological laboratory equipment, as well as to determine the intensity of the use of biological laboratories in supporting biology learning in State Madrasah Aliyah throughout Sleman Regency. The sample used, namely 4 MAN includes 103 students of class XI IPA, 3 Heads of Laboratory and 4 Biology teachers. This research is a survey research with a quantitative descriptive approach. Data collection techniques were carried out using observation sheets, questionnaires, and interview sheets. Based on the results of the data analysis, the research showed that the level of completeness of laboratory equipment in MAN in Sleman Regency was 58.5%, while for laboratory conditions the percentage was 96.4%. As well as the level of usefulness of the biology laboratory in supporting learning activities, the result was 78.8%. The intensity of using biological laboratories in MAN in Sleman Regency obtained results with a percentage of 56, 2%. Based on these results, the biology laboratory needs further attention so that it can be improved again so that learning can be achieved optimally.
Keywords: completeness, usefulness, intensity, laboratory

Running title: Study of Completeness and Utilization of Biology Laboratories as Supporting Biology Learning

INTRODUCTION

The laboratory is one of the learning infrastructure that can be used as a place to train students to understand concepts and improve skills in conducting scientific experiments (Emda, 2014). Seeing the importance of activities supported by laboratories, each school should carry out practicum and have supporting facilities and infrastructure for the learning process so that they can achieve learning goals by referring to the outline of the teaching program or the applicable curriculum (Bafadal, 2004).

Laboratory activities (practicum) in biology learning are integral to teaching and learning activities. Practicum generates learning motivation, develops basic skills in conducting experiments, becomes a vehicle for a scientific approach, and supports subject matter (Rustaman, 2003). The laboratory as a facility owned by the school requires management of the laboratory. According to Riana (2013), effective laboratory management can improve student performance. Supported by the opinion of Setyaningrum, Sriyono and Ashari (2013) good management is carried out so that the purpose of holding a laboratory to support learning can be achieved. One way to empower the potential of students is to provide a laboratory that supports learning that requires scientific work (Emda, 2014).

The laboratory is a place used by people to prepare something or carry out scientific activities. The place in question is in the form of a closed space which is commonly referred to as a laboratory building or laboratory room, it can also be an open space such as a garden, forest, or the universe. School laboratories can be used to support learning activities that require practicum (Nyoman, 2006).

Biology laboratories for SMA / MA level have criteria or standards that have been determined by the Education Office in the Regulation of the Minister of National Education (Permendiknas) Number 24 of 2007 concerning the standard of infrastructure for SMA / MA Science Laboratories. From these regulations, every school and madrasah should be able to provide adequate laboratory equipment for use in lessons. However, in reality there are still many schools that have not been able to implement these regulations. There are many obstacles experienced by schools in fulfilling laboratory completeness standards such as lack of laboratory management, lack of funds, laboratory assistants who are not available in certain schools.

In general, laboratory management is based on several main points which will be explained as follows (Partanto, 2003).

a. A laboratory that is managed and designed to be able to grow and develop the skills of its users in a variety of practical activities. For example in a laboratory in a school environment, the manager must be intended to develop and develop students' skills and understand subject matter in the form of laboratory practical activities.
b. The laboratory must be managed and designed to be able to train the ability to compile and analyze the results of the observations, which is then continued to interpret the results of the observations, meaning that the laboratory becomes the basis for the psychomotor development of students / students / researchers.
c. The laboratory must be managed and designed to be able to train skills in designing practical activities in carrying it out. In other words, individuals involved in laboratory activities must

be able to formulate research activities properly and direct them to the desired targets.

d. The laboratory must be managed and designed in a flexible manner and not put pressure on anyone involved (Partanto, 2003).

Based on the description above, there is a need for special research to determine the completeness and usefulness of a biology laboratory as a support for biology learning activities in a school.

MATERIALS AND METHODS

This research is a descriptive research. Juliansyah (2011) states that descriptive research is research that attempts to describe a symptom, event, event that is happening now. The research technique used in this research is descriptive survey research. Survey research is used to obtain data from certain natural places, but researchers perform data collection treatments, for example by distributing questionnaires, tests, structured interviews, and so on (Sugiyono, 2012).

The sampling technique used in this study was purposive sampling. Purposive sampling is a sampling technique with special considerations so that it is worthy of being sampled (Juliansyah, 2011).

RESULTS AND DISCUSSION

A. Data Completeness Level and Laboratory Equipment Condition

The results of the research on the availability of biological laboratory equipment in 4 MANs throughout Sleman Regency obtained a percentage of 58.5% indicating that the availability of biological laboratory equipment in MANs throughout Sleman Regency means that it has not met the specified minimum standard. These results were obtained from the recapitulation of data processing from all Madrasahs studied in this study, namely there were 4 schools.

Table 1. Percentage of equipment completeness of the MAN Biology Laboratory in Sleman Regency

No	School Name	Percentage
1	MAN 1 Sleman	53,7%
2	MAN 2 Sleman	53,7%
3	MAN 4 Sleman	57,7%
4	MAN 5 Sleman	68,8%
Rerata (%)		58,5%

Thus, for the results of the percentage of laboratory equipment completeness in several MANs in Sleman Regency, from the four schools above, the percentage was 58.5%. Several factors affect the completeness of practicum equipment including the availability of laboratory assistants or officers who recapitulate the equipment that is lacking or that is needed, periodic inventory of tools, and standardization of equipment for practicum in a school it self.

Table 2. Percentage of biological laboratory equipment conditions

No	School Name	Percentage
1	MAN 1 Sleman	100 %
2	MAN 2 Sleman	90,7 %
3	MAN 4 Sleman	96,1 %
4	MAN 5 Sleman	100 %
Rerata (%)		95,4 %

The results of the research on the condition of biological laboratory equipment in MAN in Sleman Regency obtained a percentage of 96.4%, which indicates that the condition of laboratory equipment at school has met the criteria set by the Minister of National Education Regulation No. 24 of 2007. A complete laboratory will affect a science learning process. , because the laboratory itself is a place to conduct experiments and research. Widayanti in (Katili, et al. 2013) states that a laboratory is a room for carrying out practical or research activities supported by a complete set of laboratory equipment. Besides there are research results regarding the level of completeness of biological laboratories, there are also research results regarding aspects of laboratory conditions. Biological laboratory conditions include laboratory designs and supporting infrastructure in laboratory-based learning (Litasari, Setati, Herlina, 2014).

Biology laboratories will not be useful if they are not supported by existing facilities or tools in the laboratory to carry out practicum. Complete facilities or tools and materials in a biological laboratory are needed to support biological laboratory activities (Wanmustafa, 2011).

According to (Mulyasa, 2009) educational facilities and infrastructure can make an optimal contribution to the educational process, the availability of adequate learning facilities quantitatively, qualitatively, and relevant to needs and can be used optimally for the benefit of the education and teaching process, both by teachers as teachers. as well as students as students.

B. Usability Level of Biology Laboratory

The data on the level of usefulness of the biology laboratory were obtained from the distribution of questionnaires conducted in four madrasas, namely MAN 1, 2, 4, and 5 Sleman with 103 students as respondents and four class XI biology teachers. The results of the research on the benefit of biological laboratories in MAN in Sleman

Regency obtained a percentage of 78, 8%. That is, it has been used properly.

The recapitulation results were obtained from the overall recapitulation in four madrasas. In addition, the researcher also presented the percentage results for each school. The percentage results obtained are obtained from the calculation of the total score for the usefulness of the biological laboratory divided by the ideal number of laboratory usefulness scores then multiplied by one hundred percent. The results of the percentage of data acquisition on the usefulness of the biological laboratory can be seen in the following table.

Tabel 3. Percentage of Utilization of MAN Biology Laboratories in Sleman Regency

No	School name	Respondents		Total score	Ideal score	Percentage	Average
		Type	Amount				
1	MAN 1 Sleman	Students	26	2102	2600	80,80%	78, 9%
		Teacher	1	77	100	77%	
2	MAN 2 Sleman	Students	25	2030	2500	81,20%	79, 1%
		Teacher	1	77	100	77%	
3	MAN 4 Sleman	Students	22	1606	2200	73%	75%
		Teacher	1	77	100	77%	
4	MAN 5 Sleman	Students	30	2488	3000	82,90%	82, 45%
		Teacher	1	82	100	82%	
Average							78, 8%

One of the standard demands that must be met by the teacher is the standard of professional competence, where the teacher must use all potential in order to develop students to be able to creatively explore information and be active in a learning process, so that in students there is a new experience. Elseria, 2016).

With this foundation, it means that the laboratory must be used optimally. As well as management, equipment maintenance in the laboratory must be effective. Therefore there must be collaboration between students, teachers, and laboratory managers to achieve good and optimal learning activities or practicum.

The existence of a laboratory is expected so that the biology learning process can be carried out as optimally as possible, although biology learning activities can still be carried out without practicum. But by doing practicum, there is a role for the laboratory in school learning, including practicum to generate motivation to learn biology, develop basic skills to do experiments, become a vehicle for learning a scientific approach and practicum to support subject matter (Rustaman in Hamidah 2013).

C. Intensity of use of the Biology Laboratory

The results of research data regarding the intensity of using biology laboratories in supporting biology learning activities were obtained from questionnaire sheets that have been distributed to students and also interviews conducted with biology subject teachers in each school. The intensity in question is related to the biology practicum activities carried out in class XI for two smesters. The results obtained are as follows:

4.4 Intensity of Biology Laboratory Usage Based on Biology Teacher Interviews and Student Questionnaires

No.	Practicum activities	School name			
		MAN 1	MAN 2	MAN 4	MAN 5
1	Microscopic observations of cells, the substance transport system on the cell membrane and the mitotic process in fresh onion roots / preserved preparations	√	√	√	√
2	Observing plant and animal tissue	√	√	√	√
3	Motion Systems (Frames, Joints, how muscles work)	√	x	√	√
4	Measure blood pressure, measure heart rate calculation, test blood group test	x	√	x	√
5	Conducting a food substance test on various food ingredients	√	√	√	X
6	Respiration System (performs experiments to determine capacity	x	√	x	X
7	Excretory system (urine test)	x	x	x	√
8	Regulatory system (Microscopic monitoring of nerve cell structure, blind spot experiment)	x	x	x	X
Amount		4	5	4	5
Percentage		50%	62, 5%	50%	62,5%

Information :
√ = practicum carried out
x = practicum not carried out

Based on table 4, it shows that the intensity of biology learning activities (practicum) in four MANs in Sleman Regency can be averaged, amounting to 56.2% of the total practicum contained in the biology syllabus with the 2013 curriculum. Practical experiments conducted by MAN 1 and MAN 4 are the same, namely 4 times in 2 smesters in class XI, while MAN 2 and MAN 5 carried out 5 practical experiments conducted for 2 smesters in class XI. The intensity of biology learning activities in the laboratory is inseparable from the existence of supporting factors such as adequate laboratory equipment, adequate laboratory facilities, and preparation of laboratory activity programs that involve the head of the laboratory, laboratory assistants, and teachers teaching science subjects such as physics, chemistry and biology. Some of the things above need to be considered so that the implementation of learning using laboratory facilities can be carried out properly.

Based on the interviews conducted with each teacher at different schools, the obstacles faced when the biology lab was not carried out or did not have time to hold the practicum, namely the insufficient time limitation for holding the practicum, and the presence of a laboratory assistant who manages the laboratory is very important to help teachers prepare everything something related to biology practicum. Of the four schools, only 1 school has a laboratory, namely MAN 5 Sleman. In the XI class of SMA / MA Biology syllabus, several learning objectives must be achieved by students through observation and experiment activities which in their implementation require laboratory facilities, both inside the laboratory and outside the room (Salwa, 2015). Meanwhile, based on table 4, it shows that the intensity of biology learning activities (practicum) in four MANs in all districts obtained an average percentage of 56.2% of the total practiced, namely 8 practicums.

The benefits of biology practicum activities are that students are more interested, it is easier to remember biology material that is carried out practically because they do some scientific work procedure steps themselves, and also biology learning will be maximized if practicum is carried out. This is in accordance with the theory that the laboratory can be a learning tool for students, students, lecturers, activists, researchers and others to understand all abstract knowledge so that it becomes something concrete and real (Richard, 2014).

Sudargo & Soesy in Nor Litasari et al (2014). Stating that practicum-based biology learning can improve students' critical thinking skills and process skills. Practicum carried out in the laboratory in biology learning in biology learning is in line with the principles of constructivism in learning. In addition, practicum in the laboratory has considerable benefits and experiences for students in the three learning domains. In the cognitive realm, practicum in the laboratory provides benefits in helping students understand. In the affective domain, practicum can train students' scientific attitudes. In the psychomotor domain, practicum implementation can train students' skills in using tools and materials (Jumaini, 2013).

Basically, laboratory management is a shared responsibility of both teachers and students. Therefore, everyone involved must have awareness and feel called to organize, maintain and optimize the laboratory as much as possible. So that the laboratory always continues to function as it should.

CONCLUSION

1. The level of completeness of biological laboratory equipment in MAN in Sleman Regency has not met the minimum standard set by the government, namely the percentage obtained is 58.5%. The condition of the biological laboratory equipment obtained a percentage of 96.4%, of the minimum standard set. While the level of usefulness of biological laboratories obtained results with a percentage of 78.8% that have been utilized properly.
2. The intensity of using biological laboratories to support learning activities in MAN in Sleman Regency is an average percentage of 56.2% of biology learning material carried out by practicum in the laboratory in the 2019/2020 academic year.

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