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THE EFFECTIVENESS OF USING THE LABORATORY IN LEARNING SCIENCE

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Abstract

The science that studies nature and its processes are called Science. When learning about Science, the laboratory has an essential role in growing students' experimentation abilities and increasing students' enthusiasm for learning. This study aims to describe and determine the effectiveness of the use of laboratories in science learning

at SMPN 2 Lumajang. This study uses an approach with the interview method. This research was carried out at SMPN 2 Lumajang, which involved subject science teachers at the SMPN. The results showed that the science laboratory at SMPN 2 Lumajang had two rooms: a laboratory room and a storage room. Judging from the aspect of the laboratory space, the science laboratory of SMPN 2 Lumajang still needs to be improved a bit, such as a space to store tools and materials, and there is no preparation room to make preparations before the practicum begins. The existing facilities and infrastructure influence the effectiveness of the use of laboratories in the learning process. With complete facilities and infrastructure, student learning activities in observations will run smoothly.

Keywords: *Laboratory, Science Learning, Effectiveness*

Abstrak

Ilmu yang mempelajari tentang alam dan proses yang ada didalamnya disebut Ilmu Pengetahuan Alam (IPA). Ketika belajar tentang IPA, laboratorium memiliki peranan penting untuk menumbuhkan kemampuan siswa dalam eksperimen dan meningkatkan semangat belajar siswa.Penelitian ini bertujuan untuk mendeskripsikan dan mengetahui efektivitas penggunaan laboratorium dalam pembelajaran IPA di SMPN 2 Lumajang. Dalam penelitian ini menggunakan pendekatan kualitatif dengan metode wawancara. Penelitian ini dilaksanakan di SMPN 2 Lumajang, yang melibatkan guru mata pelajaran IPA di SMPN tersebut. Hasil penelitian menunjukkan

laboratorium IPA di SMPN 2 Lumajang terdapat 2 ruangan yaitu ruang laboratorium, serta ruang penyimpanan. Dilihat dari aspek ruang laboratorium, laboratorium IPA SMPN 2 Lumajang masih harus sedikit diperbaiki seperti ruang untuk menyimpan alat dan bahan, serta belum terdapat ruang persiapan untuk melakukan persiapan sebelum praktikum dimulai. Efektivitas penggunaan laboratorium dalam proses pembelajaran siswa dipengaruhi oleh sarana dan prasarana yang ada. Dengan sarana dan prasarana yang lengkap, kegiatan belajar siswa dalam bentuk pengamatan akan berjalan dengan lancar.

Kata Kunci: *Laboratorium, Pembelajaran IPA, Efektivitas*

Introduction

Sciences is a branch of science that studies natural phenomena. Sciences aims to understand nature and its vast contents. The purpose of learning science is to increase the effectiveness of learning, interest, motivation and to develop and expand science materials such as biology, physics, chemistry. In addition to this, students who study natural sciences or science, students can master science in the form of facts, concepts, or principles, and students also know the process of discovery in research.

Laboratory is an academic support unit in educational institutions, either in closed or open, permanent or mobile form, the management system and its utilization are local in the context of providing education, research, and community service, using tools and materials based on certain scientific methods to test, calibrate, or produce on a limited scale (PermenPANRB, 2010). The laboratory is an infrastructure that must be provided by the school in supporting the effectiveness of science learning in SMP/MTs.

In the use of the laboratory and any activities carried out in the laboratory, it can run effectively if the management of the laboratory involves personal and user management. Management of laboratories such as buildings, equipment, and funds for other laboratory materials that involve personal management and users can maintain the continuity of their functions and improve teachers' ability in the laboratory management process according to Permendiknas No. 26 of 2008 concerning laboratory management standards in schools (Daud, 2017).

Special training should be given to the head of the laboratory and laboratory assistants to practice skills in managing the laboratory professionally. Professional laboratory management will help subject teachers and students to carry out scientific learning. Good facilities in the school laboratory are a particular entity to provide benefits in the learning process of students at school. Based on Permendiknas No. 26 June 2008 concerning standards for laboratory management in schools or madrasah, monitoring of laboratory implementation and activities, and evaluation of activities in experimental rooms (Senta & Neolaka, 2014). Therefore, the management of the science laboratory will support the implementation of the teaching and learning process that is useful for improving the quality of the process and student learning outcomes.

The application of theory in teaching and learning activities with laboratory activities (practicum) can improve process skills, problem-solving abilities and increase students' interests and attitudes in learning (Rozi et al., 2020). Activities in the laboratory aim to improve theory, but students can find their knowledge; the higher

the involvement of students in practical exercises, the higher the achievement of students' understanding and process skills.

Currently, the standards and requirements faced by teachers must be following the Minister of National Education Number 16 of 2007, including professional competency standards. Teachers must mobilize their potential and foster student creativity in the mining sector. Gather information and actively participate in the learning process. The most excellent level of interaction between teachers, students, and the community marks the existence of Paris, efficient and active fieldwork that allows students and the community to have new experiences (Elseria, 2016; Bali et al., 2021). On this basis, scientific laboratories must be operated and managed effectively. Science teachers have to do real work in science laboratories because many disciplines have to use experimental methods. If you only talk theory without practice, the realization of the target is impossible or abstract, so many students do not understand or understand. Many schools are not functioning well, and the delivery of subjects is only theoretical. Many school

laboratory coordinators are not professionals or even laboratory personnel.

Of course, all parties hope that each school can manage laboratories effectively so that all conditions in the laboratory learning process can run well and effectively. However, there are still many schools that do not have valuable and effective scientific laboratory management. This study aims to determine the effectiveness of the science laboratory as support in science learning.

Method

In this study using a qualitative approach with the interview method. The qualitative method is one of the methods used in this study by using data from narratives sourced from interviews, documents, and observations. This research at SMPN 2 Lumajang involved a science teacher at the SMPN. The interview method or guided interview conducted here is a researcher asking the resource persons things prepared in advance. It is explained that the interview is conducted to know the effectiveness of the science laboratories in schools as

supporting the learning process. In doing this method, researchers and resource persons face each other or face to face to conduct interviews to obtain the desired or required data. The instruments and methods of data collection used in this study were arranged based on the objectives of the subject and the object of research.

Results and Discussion

Results

One of the branches of science that studies nature and its processes is called science or science. When carrying out the science learning process, the laboratory supports student learning activities significantly to grow students' abilities in experiments. According to Rustaman, there are four reasons why it is essential to carry out practical activities in learning science. First, practicum activities increase the enthusiasm for learning science. Second, practicum can improve the basic skills of carrying out experiments. Third, practicum becomes a learning tool with a scientific approach. Fourth, practicum as a support for the learning process (Yuliana et al., 2017).

A laboratory is a place used when conducting experiments or investigations related to the sciences of biology, physics, and chemistry. In school, the laboratory is used for practicum activities, the function of practicum activities, according to Sudargo (Sulistyowati, 2019) is to understand the scientific process, which aims to support students' understanding of concepts or principles of science. In the learning process, practicum seeks to train students to work scientifically in understanding phenomena and events by observing and experimenting.

The standard of a good science laboratory room can accommodate a minimum of one study group with less than twenty students. Every science laboratory room in junior high school (SMP) must comply with the regulations of the Minister of National Education. In table 1, based on the observations, it has been explained that there are no spaces in the science laboratory at SMP Negeri 2 Lumajang.

Table 1. Science Laboratory Room at SMPN 02 Lumajang

No	Type	Permendiknas Standard	Information
1.	Science laboratory room	Can accommodate one study group	There is

No	Type	Permendiknas Standard	Information
2.	Storage space	Equipped with storage space	There is not any
3.	Preparation room	Equipped with preparation room	There is
4.	Lighting	Equipped with adequate lighting	There is
5.	Clean water	Clean water available	There is not any

(Source: Permendiknas no. 24, 2018)

The results of the science laboratory observations at SMPN 2 Lumajang have two rooms, namely the laboratory room and the storage room. The area of the science laboratory space has met the Minister of National Education standards because it can accommodate one study group. The science laboratory space at SMPN 2 Lumajang can accommodate approximately thirty students. The practicum room is equipped with a blackboard, thirty student chairs in good condition, thirty tables. In addition, it is also equipped with electrical installations, including four sockets in good condition and six lamps in good condition. There are several other facilities in the laboratory room, namely brooms, trash cans, wall clocks, and two AC rooms in good condition. However, in the science laboratory room at SMPN 2

Lumajang, there are no washtafle and fire extinguishers.

However, since 2017 the science laboratory has not only been used for practicum activities since the government has held a computer-based National Examination (UNBK), the science laboratory room is approaching the implementation of school exams, the National Examination is temporarily used as a computer room, this is because the existing computer room can only accommodate a few students. The science laboratory room is used as usual when the exam is over.

Figure 1. Science Laboratory Room

The science laboratory at SMPN 2 Lumajang does not have its preparation room. This is not in line with Permendiknas regulation number 24 of 2007, which states

that the minimum area of laboratory space is 48 m2, including storage and preparation space. The preparation room has an essential role in the laboratory, namely to carry out practicum preparations, including the preparation of tools and materials to be used in the practicum, demonstration of experimental equipment, or conducting research (K. Rahman et al., 2019; Bali & Musrifah, 2020).

The storage room in the science laboratory at SMP Negeri 2 Lumajang stores tools and materials used in practical activities. Inside the storage room, there are models of the human skeleton, torso props, four wooden cabinets used to store microscopes, and other physics and biology practicum tools. Chemicals are not placed in the storage room but a cupboard at the back of the practicum room, and there is one cupboard to store chemicals used for practicum.

Figure 2. Science Laboratory Storage Room SMPN 2 Lumajang

Figure 3. Chemical Storage Cabinet

The storage space in the science laboratory of SMPN 2 Lumajang is not well organized, and some practical tools are not placed in a storage cupboard. Some of the storage cabinets in the laboratory are in good condition, and some

are in a situation like a picture 2, the glass of the upper storage cupboard is broken. The Ministry of Education and Culture explained in the 1999 science laboratory arrangement technician training that the arrangement of material tools must be adjusted to the specifications of tools and materials. Grouping tools must be adapted to the Science subject group (physics, chemistry, biology) (M. S. Rahman, 2017). Based on these circumstances, the storage space in the science laboratory of SMP Negeri 2 Lumajang is less than optimal because the tools and practicum materials are not stored neatly. One of the glasses from the storage cabinet is broken; this causes the tools used for practicum to be dusty and can result in the device is not functioning correctly or is damaged.

According to Permendiknas number 24 of 2007, the laboratory room should also provide adequate lighting when students read books and observe experimental objects. In this case, the laboratory of SMPN 02 Lumajang has six light bulbs with the lamp's position being able to illuminate every corner of the room, both front and back, and function properly. This is in line with the opinion This

is in line with the opinion the position of the lamp must be appropriately arranged so that all corners in the room can be bright and the learning process activities run smoothly (Hamid, 2011).

Discussion

From the aspect of the laboratory space, the science lab in the SMPN 2 Lumajang still has to be little fixed as space used for storing tools and ingredients of practicality, nor is there a preparatory room used in preparation before carrying out this activity of practice. Sources of funds and laboratory operations come from the BOS (school's operational assistance). Every year, the school proposes the activity plan needed by the SMP Negeri 2 Lumajang

laboratory to be submitted to the party concerned.

There is an organizational structure in the laboratory of SMP Negeri 2 Lumajang because it is a public school. Namely, some supervisors monitor and program the laboratory's work. The organizational structure consists of school principals, waka curriculum, head of laboratories, managers, subject teachers, and students. However, laboratory assistants specifically do not exist, so they are carried out by the teachers themselves. The organizational structure in the laboratory of SMPN 2 Lumajang is in line with the 2017 Ministry of Education and Culture regarding the work guidelines for school/madrasah laboratory personnel. The qualifications of each member in the structure do not meet the standards; following Permendiknas Number 26 of 2008 concerning Standards for School or Madrasah Laboratory Personnel to serve as a laboratory assistant, and it is mandatory to have a school or madrasa laboratory certificate from a university set by the government (Pujani & Selamet, 2020). Meanwhile, at this school, the laboratory assistants come from science teachers at SMPN 2 Lumajang.

The implementation laboratory at SMPN 02 Lumajang is adjusted to the taught material. Standard Operating Procedures (SOP) are made; the teacher explains the rules that the students must obey during the practicum, the students are careful when they are in the laboratory. When learning materials require a laboratory, the laboratory will function as usual. Still, when teaching and learning activities are carried out with material related to observing the natural surroundings, for example, observing non-living objects and living things, learning can be carried out outdoors, the teacher will invite students to carry out outdoor learning so that students do not feel bored. The teacher tries as much as possible to ask students to carry out practicals even though there are limitations. For example, when practicum on acids and bases using litmus paper, but the litmus paper is not available, the teacher replaces it by using natural indicators such as turmeric. Even though doing a practicum with simple tools and materials, at least students have the knowledge and experience in learning the material to develop and recall during evaluations or exams with the HOTS question

model.

Before the pandemic, every teacher who had a practicum schedule, the teacher and students worked together to prepare tools and materials so that the practicum to be carried out could run well and smoothly. Suppose the practicum to be carried out clashes between classes. In that case, the teacher takes the initiative so that the implementation of the practicum can still be carried out even though it cannot be done in the laboratory but the classroom. The results of interviews between researchers and science teachers at SMPN 2 Lumajang revealed that students tend to be more interested and enthusiastic about learning science coupled with practicum. By carrying out practical activities, students can find new concepts related to the material. Students can grow creative, active, innovative, and curious through the practicum. When doing a practicum in class, the teacher is assisted by students to take the tools and materials needed from the laboratory and then brought to class. Before carrying out the practicum, the teacher explains the practical steps, how to operate the tool and urges students not to joke when

using the tools and practicum materials in the laboratory room and the classroom. The teacher also explains the purpose of the practicum. The teacher remains in the room during the practicum to guide and supervise students.

Factors that affect the effectiveness of using the laboratory as a supporter of the student learning process are the existing facilities and infrastructure. Through complete facilities and infrastructure, practicum activities will be carried out smoothly to understand the learning material well. Several factors affect the effectiveness of laboratory management, including the availability of facilities in quantity and the quality and competence of laboratory managers (Samiasih et al., 2013).

Conclusion

The science laboratory in SMP Negeri 2 Lumajang has two rooms: a laboratory room and a storage room. The area of the science laboratory space has met the Minister of National Education standards because it can accommodate one study group. Since 2017 since the implementation of the Computer-Based National Examination (UN-BK)

policy, the science laboratory is also used as an additional room during the Computer-Based National Examination (UN-BK) due to the lack of facilities room owned by the school. The science laboratory room at SMPN 2 Lumajang still needs to be improved, such as a storage room for tools and materials, and does not yet have a preparation room used to prepare before the practicum begins.

The existing facilities and infrastructure influence the effectiveness of using laboratories to support student learning activities. With complete facilities and infrastructure, practicum activities will run smoothly to understand the learning material well. With practicum activities, students can find new concepts related to the material.

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