Journal on Bology and Instruction (JouBIns) **ISSN 2978-0863**
Vol. 2 No. 2 Tahun 2022 | 77 – 88

Biology laboratory: facilities, infrastructure, and their utilization in biological learning

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Article information

Article history
Received: Sept 25, 2022
Revised: Nov 11, 2022
Accepted: Dec 8, 2022

Keywords:
Biologi SMA
hambatan
pelaksanaan praktikum

ABSTRACT

Pembelajaran biologi bukan hanya sekadar teori tetapi perlu dilakukan kegiatan praktikum. Sarana dan prasarana laboratorium yang sesuai dengan Permendiknas No 24 Tahun 2007 diperlukan dalam menunjang kegiatan praktikum. Penelitian ini bertujuan untuk mengetahui kesesuaian sarana prasarana laboratorium, jenis pemanfaatan laboratorium biologi dan mengetahui kendala yang memengaruhi kegiatan praktikum biologi. Penelitian ini merupakan penelitian studi literatur dengan menggunakan 30 artikel. Pencarian artikel menggunakan database online dengan kata kunci pencarian artikel "the use of laboratory biology", "laboratorium biologi", " sarana dan prasarana laboratorium biologi", "pemanfaatan laboratorium biologi", dan "analisis praktikum biologi" serta rentang waktu antara 2010-2020. Teknik analisis data penelitian ini menggunakan teknik analisis deskriptif. Hasil penelitian menunjukkan bahwa sarana dan prasarana laboratorium biologi di sekolah sebagian besar sudah sesuai dengan standar Permendiknas No 24 Tahun 2007. Jenis pemanfaatan laboratorium biologi diantaranya untuk kegiatan pelaksanaan praktikum, berfungsi meningkat hasil belajar peserta didik, memanfaatan alat dan bahan praktikum. Kendala yang memengaruhi kegiatan praktikum biologi yaitu desain ruang yang belum sesuai aturan, belum tersedianya jadwal praktikum, keterbatasan alat dan bahan praktikum, belum tersedianya tenaga laboran, keterbatasan anggaran dana, dan hambatan yang berasal dari guru.

Keywords:
Biology senior high school
obstacles
Practical implementation

ABSTRACT

Biology Laboratory: Facilities, Infrastructure and Utilization in Biology Learning. Permendiknas No 24 of the 2007 rule are a requirement to support practicum activities. This study aims to determine the suitability of laboratory infrastructure, types of biology laboratory utilization, and the constraints that affect biology practicum activities. This research is a literature study using 30 articles. Search for articles using online databases with search keywords for articles "the use of laboratory biology", "biological laboratories", "biological laboratory facilities and infrastructure", "utilization of biological laboratories", and "biological practicum analysis" and the time range between 2010-2020. The data analysis technique of this research uses descriptive analysis techniques. The results showed that most of the

biology laboratory facilities and infrastructure in schools' accordance with Permendiknas standards No. 24 of 2007. Types of the utilization of the biology laboratory include carrying out practicum activities, functioning to increase student learning outcomes, and utilizing practicum tools and materials. Obstacles that affect biology practicum activities are space design that is not appropriate with the rules, practicum schedule is not yet available, practicum tools and materials are limited, laboratory staff is not available, budget constraints are limited, and obstacles coming from teachers.

INTRODUCTION

Biology is one part of the natural sciences that studies the symptoms of nature. Biology as one of the fields of science provides a variety of learning experiences to understand the concepts and processes of science (Kusumaningtias et al., 2013: 33). Biology learning is essentially a process to deliver students to their learning goals and biology acts as a tool to achieve these goals (Hasan et al., 2017: 2). Biological characteristics must be able to interact directly with living things and cannot be separated from the laboratory to carry out practicum (Lubis et al., 2017: 17). Therefore, a practicum is needed to support students to gain real experiences that can be felt by every student in the biology learning process.

Practicum is an activity that aims to give students the opportunity to test and apply the theory that has been received to certain materials. Practicum activities play a very important role in supporting the biology learning process which emphasizes cognitive (knowledge), affective (attitude), and psychomotor (skills) aspects. Classroom learning is composed of a systematic plan that involves learning methods.

One of the learning methods is practicum. According to Suryaningsih (2017: 51), learning with practicum activities students are able to master concepts, facts and scientific processes so as to improve students' skills. Laboratory facilities and infrastructure are also needed in order to support practicum activities, so that practicum activities can run smoothly.

A laboratory that is often abbreviated as a "lab" is a place where scientific research (research), experiments (experiments), measurements, or scientific training are carried out. Scientific laboratories are usually distinguished according to their disciplines such as physics laboratories, chemical laboratories, biochemical laboratories, computer laboratories, and language laboratories (Decaprio, 2013: 16). The laboratory is a place in the form of a building bordered by walls and roofs in which there are a number of practicum tools and materials. Laboratories in biology learning can be in the form of open spaces or open nature and or in the form of special rooms (Agustina & Ningsih, 2017: 39).

The facilities and infrastructure of the biological laboratory for the high school level are regulated in the Regulation of the Minister of National Education No. 24 of 2007 concerning Standards of Facilities and Infrastructure for Elementary Schools/MI, Junior High Schools/MTs, and High Schools/Ma. Standards for biology laboratory rooms for SMA / MA, namely 1) The biology laboratory room serves as a place for practical biology learning activities that require special equipment; 2) The biology laboratory room can accommodate a minimum of one study group; 3) Minimum ratio of biological laboratory space 2.4 m^2 / student. For study groups of students less than 20 people, the minimum area of the laboratory room is 48 m 2 including the storage and preparation room area of 18 m^2. The minimum width of the biological laboratory space is 5m; 4) The biological laboratory room has facilities that allow adequate lighting for reading books and experimental objects. The equipment that must be owned by the biology laboratory in SMA / MA is the category of furniture, educational equipment, educational media, consumables, and other equipment.

Based on the results of preliminary observations at one of the state high schools in Yogyakarta, it is known that the biology laboratory is separated from the physics laboratory and the chemistry laboratory. In addition, the biological laboratory already has laboratory personnel. The results of an initial interview at one of the Yogyakarta State High Schools to biology teachers are known that the biology laboratory is still used multifunctionally for religious activities and meeting rooms. Limited practicum tools and materials in the biology laboratory and practicum schedules that have not been made regularly can result in clashes in practicum activities. This shows that the use of biological laboratories has not been utilizedoptimally in supporting curricular activities in schools.

Differences in school laboratory conditions and the learning process of implementing biology practicum make researchers interested in studying infrastructure and the use of biology laboratories in learning biology through literature studies. The research using this literature study was carried out because at the time of the research implementation, there was a Covid-19 pandemic that did not allow direct research in the field. The objectives of this study are to: 1) determine the suitability of biological laboratory facilities and infrastructure with Permendiknas No. 24 of 2007; 2) know what are the uses of biological laboratories in biology learning; 3) knowing what are the constraints that affect biological practicum activities.

METHOD

This research is literature study research with a narrative review design. Literature study research is an activity to collect information and data from various sources such as books, articles, journals, and theses / thesis related to the research to be studied. Narrative review according to Greenhalgh et al., (2018: 2), is a literature analysis that presents a summary (not systematic), contains about a particular topic of interest, and there are no official guidelines for writing narrative reviews.

The literature search in this study used an online database sourced from international journals, accredited national journals, unaccredited national journals and proceedings, and theses. Article search uses the keywords "the use of laboratory biology", "biological laboratory", "biological laboratory facilities and infrastructure", "utilization of biological laboratories", and "biological practicum analysis". From the results of journal searches, various journals were obtained with the following details: 2 international journals, 24 accredited national journals, 13 articles unaccredited national journals, 8 articles proceedings, and 3 theses. Updated articles use a time range between 2010-2020.

In the early stages of the search, 51 articles were obtained which were then validated to 30 articles. The basis used in choosing the article is: 1) the research method from the article used in this study is limited to qualitative descriptive methods, quantitative descriptive, documentation and surveys; 2) the quality of data presentation and discussion of clear data related to laboratory infrastructure, laboratory utilization, and constraints affecting practicum activities; 3) the adequacy of data for analysis or the suitability of the content of articles about laboratory infrastructure, laboratory utilization and constraints affecting practicum activities; 4) the references are up to date and relevant i.e. the last 10 years (2010-2020).

The technique of presenting data from 30 validated articles is in the form of tables and description texts based on the authors and the results of relevant research data. Literature analysis techniques use qualitative descriptive analysis techniques. Miles and Huberman (quoted in Sugiyono, 2016), stated that the stages of qualitative data analysis consist of three stages, namely 1) data reduction, 2) data presentation and 3) verification.

RESULTS AND DISCUSSION

The article search was carried out in 2020 when the Covid pandemic was still hitting Indonesia. From each sub-topic of discussion, one table is presented, making it easier for readers to understand the results of the following research. The recapitulation of the article that has been done can be observed in Table 1.

Table 1. Recapitulation of research articles onthe condition of biological laboratory infrastructure

No	Author	Research results
1	Kimura & Idramsa (2019)	The state of the biological laboratory at SMA Negeri 1 Tebing Tinggi is relatively good (78%). SMA Negeri 1 already has its own biology laboratory, which is equipped with a main room / practice room, preparation room and storage room for tools and materials.
2	Yohana & Agustina (2018)	In general, the biology laboratory at SMA Muhammadiyah 3 Surakarta is in the good category with an average score of 64.3%.
3	Qonitat & Agustina (2018)	The results of research on biological laboratory facilities and infrastructure in the good category with an average percentage of 69.96%
4	Munarti & Sutjihati (2018)	Laboratory facilities and infrastructure as a whole still do not meet the standards set forth in the Minister of Education and Culture Number 24 of 2007.
5	Rahmi & Sasmita (2018)	All aspects observed show data that is standard and in accordance with Permendiknas No. 24 of 2007. However, there are several other equipment that have not been equipped such as sockets equipped with safety, fire extinguishers, and P3K.
6	Simatupang & Sitompul (2013)	The completeness of facilities and infrastructure is relatively good. The lab facilities are still solid and good. The furniture in the category is excellent. Educational equipment, educational media, and other equipment in the good category. Consumables on the category are not good.
7	Agustina & Ningsih (2017)	The biological laboratory is relatively good, the laboratory is quite adequate because it is spacious and located on the ground floor. Almost all tools and materials are in good condition and complete.
8	Purnama, Pulungan, & Manik (2017)	The results of the data research obtained by SMAN 1 Salak have 100% completeness of facilities and infrastructure. The completeness of the facilities and infrastructure of SMAN 1 Kingdom, which is 94.87%. The completeness of the facilities and infrastructure of SMAN 1 Tinada, which is 89.74%.
9	Lestari, Fifendy, & Ardi (2017)	The availability of biological laboratory equipment in SMAN throughout Pasaman Regency is 72.2% with less available criteria.
10	Siburian, Sinambela, & Septie (2017)	Equipment in the biology laboratory of SMAN 16 Medan is included in the criteria quite well with a percentage of 57.7%. The biological laboratory is still merged with the physics and chemistry laboratory.
11	Diana (2017)	Some high schools are in accordance with Permendiknas No. 24 of 2007 and some other high schools have not met the standards of permendiknas. A biological laboratory room that has not been separated from the physics and chemistry laboratory.
12	Rosdiana, Khuzaemah, & Gloria (2016)	The design of the laboratory room in the category is quite good. The biological laboratory room is still integrated with the physics and chemistry laboratory. The laboratory room only has a practice room and a storage room. Practicum tools and materials are in the good category.
13	Nasution & Hasairin (2016)	The condition of facilities and infrastructure at Nusantara Lubuk Pakam Private High School is relatively good, consisting of the condition of the laboratory room, laboratory equipment, laboratory equipment.
14	Rezeqi (2015)	Of the 9 high schools in Karo district, only 1 school has incomplete laboratories, 5 schools have labs with complete criteria, and 3 schools with very complete laboratories.
15	Nuada & Harahap (2015)	The state of the laboratory facilities in the category is excellent, the equipment of the category is good.
16	Melda, Fauziah, & Arnentis (2015)	Completeness of biological practicum tools and materials based on Permendiknas No. 24 of 2007 SMA Negeri Pekanbaru in the complete category.
17	Litasari, Setiati, & Herlina (2014)	The design of the laboratory in general is in accordance with the provisions. The completeness of practicum tools and materials is still limited.

18	Mastika, Adnyana, & Setiawan (2014)	The existing science / biology laboratory infrastructure facilities at Denpasar City State High School have not met the minimum 100% standard, which is 80.56%
19	Indriasuti, Herlina, & Widiyaningrum (2013)	The results of the research on the facilities and infrastructure of the biological laboratory of 2 schools are in accordance with Permendiknas No. 24 of 2007 but the other 3 schools are not in accordance with Permendiknas No. 24 of 2007.

The suitability of biological laboratory facilities and infrastructure based on the results of the study states that, most of the biological laboratory facilities and infrastructure are in accordance with the standards of the Minister of National Education No. 24 of 2007. However, it was still found that biological laboratories joined by physics and chemistry laboratories such as, SMAN 16 Medan, SMA Gajah Mada Bandar Lampung, SMA Surya Dharma 2 Bandar Lampung, MA Nurul Haurgeulis, and several high schools in Pekanbaru (Diana, 2017; Melda et al., 2015; Rosdiana et al., 2016; Siburian et al., 2017).

The biological laboratory needs to be equipped with facilities and infrastructure as stated in permendiknas No. 24 of 2007. Articles discussing the facilities and infrastructure of biological laboratories were obtained as many as 19 articles. Aspects observed or research indicators of biological laboratory facilities and infrastructure include laboratory rooms, furniture, educational equipment consisting of props and experimental tools and materials, educational media, consumables, and other equipment. Based on the results of the analysis of literature studies, it was found that the biological laboratory was already separated from the physics laboratory and the chemistry laboratory. The laboratory is equipped with a practice room, a separate storage room for tools and materials, as well as a preparation room in adequate condition, such as a biology laboratory at SMA Negeri 1 Tebing Tinggi (Kimura & Idramsa, 2019: 2019). This is according to Munandar (2016: 26), an adequate laboratory has at least 5 rooms with a building size and a room suitable for its designation, namely a) office space; b) preparation room (preparation); c) practice room/main room; d) tool storage space; e) chemical storage room.

The biological laboratory room based on the results of the analysis of literature studies shows that the conditions are quite adequate and still solid. The laboratory area is adequate so that it can accommodate as many as 40 students, located on the ground floor, and sufficient lighting is equipped with sufficient lights and air vents. According to the Regulation of the Minister of Education and Culture No. 25 of 2017, the biological laboratory functions as a place for practical biology learning that requires special equipment. The prerequisites for the utility of the biological laboratory room include, a) the laboratory is equipped with 2 doors; b) in the practice room light openings of at least 9.6 m 2 and air vent openings of at least 4.8 m^2; c) the number of lamps is at least 8 and uses TL lamps (20W). The biological laboratory is equipped with adequate and available equipment. Such equipment as tables, chairs, demonstration tables, preparation tables, cabinets of tools and materials, sinks. In addition, tool cabinets and material cabinets have also been separated with good condition.

Educational equipment consists of teaching aids and experimental tools and materials. The props indicator based on Permendiknas No. 24 of 2007 consists of 25 items. Equipment The results of research related to educational equipment in the aspect of teaching aids showed results in the good category in accordance with Permendiknas No. 24 of 2007. As for the props that are not yet available in the biological laboratory, namely human skeleton models, human body models, mitosis preparations, animal anatomy preparations, plant anatomy preparations, meiosis preparations, pictures of plant samples from various divisions, drawings of animal samples from various phylums, and pictures of evolutionary trees (Melda et al., 2015: 5; Yohana & Agustina, 2018: 524). The results of research on educational media show a good and available category, the educational media in question is a whiteboard. The availability of whiteboards in the laboratory is very important in helping the role of teachers to carry out practicum activities.

The next aspect that is an indicator of research on laboratory facilities and infrastructure is consumables. The consumables indicator based on Permendiknas No. 24 of 2007 consists of 18 items. The results of the research obtained showed that the category was not good. Consumables that are already available in the biology laboratory of SMA Muhammadiyah 2 Surakarta and SMA

Muhammadiyah 3 Surakarta, namely sulfuric acid, HCL, acetocarmine, eocin, ethanol, universal indicators, filter paper, serum A and B and alcohol sensitivity (Qonitat & Agustina, 2018: 468; Yohana & Agustina, 2018: 524). According to Melda et al., (2015: 6), consumables that are not available in the biology laboratory of SMA Negeri 8 Pekanbaru and SMA Negeri 13 Pekanbaru, namely sulfuric acid, acetocarmine, ethanol, iodine, KOH, and $MnSO^4$, NaOH and vaseline.

Based on the results of the analysis of literature studies, it was also found that the facilities and infrastructure of the biological laboratory met the standards of the Minister of National Education No. 24 of 2007. The biological laboratory room is still merged with the physics laboratory and the chemistry laboratory. Furniture that is not yet available in the biological laboratory such as demonstration tables, sinks, and water facilities. Educational equipment and consumables that are not available in biological laboratories are because some tools and materials are quite expensive. The availability and completeness of laboratory facilities and infrastructure greatly affect the learning process, especially biology. The facilities and infrastructure available in appropriate quantities and good conditions will support the process of utilizing the biological laboratory through practicum activities, so that practicum activities can be carried out and run well and smoothly.

Table 2. Recapitulation of research articles on the use of biological laboratories

No	Author	Data results
1	Kimura & Idramsa (2019) Handayani (2018) Simatupang & Sitompul (2013) Hasruddin & Rezeqi (2012)	The use of biological laboratories is seen from the aspect of the frequency of practicum implementation. The frequency of practicum implementation is still relatively poor.
2	Lubis & Rizkika (2017) Diana (2017) Litasari, Setiati, & Herlina (2014) Mastika, Adnyana, & Setiawan (2014)	Utilization of biological laboratories based on the intensity of laboratory use. The intensity of use of biological laboratories shows a good category.
3	Siburian, Sinambela, & Septie (2017) Nasution & Hasairin (2016) Nuada & Harahap (2015) Hidayati (2013)	Laboratory utilization based on aspects of practicum implementation. The implementation of class X practicum at SMAN 16 Medan is carried out ± 3 times in 1 semester. The implementation of class XI practicum at Lubuk Pakam Private High School is relatively good, with 16 practicums. The implementation of class XI practicum of SMA throughout Tanjungbalai City as many as 5 times in one semester. The implementation of practicum in Private Madrasah Aliyah with an average frequency of activities of 3 activities.
4	Lestari, Fifendy, & Ardi (2017)	The implementation of activities in the biology laboratory at State High Schools throughout Pasaman Regency was 61.4% with fairly good criteria.
5	Rosdiana, Khuzaemah, & Gloria (2016)	The use of the science-biology laboratory in supporting the implementation of the Education Unit Level Curriculum (KTSP) in biology learning is still not well implemented.
6	Mahfudiani (2015)	The effectiveness of utilizing the function of the science laboratory is in the effective category (80.3%) and the effectiveness of the utilization of science laboratory equipment is in the effective category (77.9%).
7	Melda, Fauziah, & Arnentis (2015)	The utilization of biological practicum tools and materials in the implementation of practicum at Pekanbaru State High School in the category is quite maximum, namely 70%

A good biological laboratory must meet the completeness of equipment, besides that it is also necessary to be equipped with various supporting facilities including public facilities and special facilities. Public facilities are facilities that can be used by all laboratory users such as lighting, ventilation, water, sinks, electricity and gas. Specialfacilities in the form of other equipment such

as student desks, teacher desks, chairs, whiteboards, tool cabinets/ shelves, material cabinets, weighing rooms, fume hoods, P3K equipment, extinguishers, chemical symbols and occupational safety warning signs (Agustina & Ningsih, 2017: 39).

Laboratory utilization is a process of utilizing laboratory facilities to achieve learning goals by using certain techniques or ways to support learning activities (Hidayati, 2013: 97). The articles obtained discuss the use of biological laboratories as many as 16 articles. The use of the laboratory referred to in this study is seen based on the implementation of practicum activities, the utilization of laboratory functions and the use of practicum tools and materials. The intensity of laboratory use varies greatly according to the laboratory conditions of each school. The large number of laboratory uses is influenced by the number of practicum implementations.

Laboratory utilization is part of the learning process. Through practicum activities, students can prove a theoretical concept that has been previously owned. The purpose of learning in the laboratory is to train students' rigor in order to work carefully, develop skills, train students in using tools, and stimulate students' thinking power (Zahara & Agustina, 2018: 751). The use of biology laboratories through practicum activities can increase student motivation in learning biology. Through practicum activities, students can feel real experiences, and are actively involved in the learning process. According to Kimura & Idramsa (2019: 201), students' interest in laboratory activities is in the good category. Students are enthusiastic and interested in carrying out practicum activities. Similar to the results of the study according to Dewi et al., (2017: 23), students admit that through practicum activities can increase understanding and fun.

The intensity of laboratory use varies greatly according to the laboratory conditions of each school. The large number of laboratory uses is influenced by the number of practicum implementations. According to Sobiroh (quoted in Lubis & Rizkika, 2017: 419), laboratory utilization activities can be seen from the intensity of practicum carried out by each school. The implementation of practicum in class X is carried out 3 times in one semester (Siburian et al., 2017: 30). The implementation of practicum in class XI at Lubuk Pakam Private High School and Tanjungbalai City High School was carried out 16 times and 5 times (Nasution & Hasairin, 2016: 33; Nuada & Harahap, 2015: 104).

The results of the analysis that has been carried out by researchers based on basic competence (KD) show that in class X the material that needs to be practicum, namely the scope of biology, biodiversity, protists, fungi, grouping plants into divisio, and grouping animals into phylum. The materials that need to be practised in class XI, namely cells, bioprocesses in cells, cell structures in plant tissues, cell structures in animal tissues, and digestive system matter in humans. The materials that need to be practiced in class XII, namely the growth and development of living beings, the metabolic processes of living beings, the process of cell division and biotechnology.

The second type of utilization of biological laboratories is the utilization of laboratory functions. The results of research on the use of biological laboratory functions show effective results. According to Mahfudiani (2015: 35), the utilization of laboratory functions in the category is effective in strengthening students' understanding, practicing skills, and cultivating students' scientific attitudes supported by adequate practicum equipment and clear usage procedures. There are 3 indicators of utilization of laboratory functions, namely a) strengthening students' understanding through the application of biological materials into the practicum; b) cultivate the student's scientific attitude; c) train students' skills in conducting experiments.

Another type of utilization is the use of practicum tools and materials. The results of research on the use of practicum tools and materials show quite optimal results. Indicators of utilization of practicum tools and materials according to Melda et al., (2015: 8), namely, the effectiveness and efficiency of biological practicum material tools, as well as the maintenance of biological practicum tools and materials. The results of research on the effectiveness and efficiency of practicum material tools at SMAN Pekanbaru showed optimal results. The results of research on the maintenance of biological practicum tools and materials showed suboptimal results, which were caused by the lack of awareness of teachers and students in maintaining and maintaining practicum material tools in the laboratory.

Scheduling the use of the laboratory greatly affects the implementation of all activities in the laboratory. Making a schedule for laboratory use can affect the intensity of laboratory utilization.

If the laboratory usage schedule is not determined, there will be clashes between each class. According to Rosdiana et al., (2016: 83), the obstacles faced by teachers in managing practicum schedules clash with other subjects because the laboratory is still integrated with other laboratories and there are no laboratory personnel who manage practicum activities.

Obstacles that can affect practicum activities based on the data that have been obtained include: (1) equipment and materials are not all available and even some tools are damaged, (2) the design of the biological laboratory building is not suitable, (3) limited time for practicum activities, (4) absence of practicum schedule, (5) limited budget funds, (6) absence of laboratory laboratory personnel and technicians who assist in managing biological laboratories and (7) obstacles derived from teacher. In full, the constraints of practicum activities are presented in Table 3.

Table 3. Recapitulation of research articles on the constraints of practicum activities

No	Author	Research results
1	Kimura & Idramsa (2019) Qonitat & Agustina (2018) Handayani (2018) Lestari, Fifendy, & Ardi (2017) Siburian, Sinambela, & Septie (2017) Rezeqi (2015)	1. Some of the practicum tools and materials needed are incomplete. 2. Available practicum time. 3. Rooms/laboratories that are not conducive. 4. There is no laboratory laboratory. 5. Rarely carry out a practicum on the use of nature.
2	Diana (2017) Daba, Anbassa, Oda, & Degefa (2016) Indriasuti, Herlina, & Widiyaningrum (2013) Anggriyani, Lufri, & Zulyusri (2013)	1. A biological laboratory that is still merged with the science laboratory. 2. Laboratory design that has not met applicable standards. 3. Lack of funds. 4. The absence of equipment and chemicals for prakitkum. 5. The absence of laboratory personnel. 6. The practicum atmosphere is less conducive. 7. Limited time in carrying out biological practicum.
3	Masruri (2020) Ramadhani & Titisari (2019)	1. Limitations of practicum tools and materials. 2. The absence of laboratory personnel. 3. Insufficient practicum time allocation
4	Simatupang & Sitompul (2013) Dewi, Sunariyati, & Neneng (2014)	1. There is no practicum schedule yet. 2. The laboratory is used as an additional classroom. 3. The timing of the practicum did not go well due to the transfer of classes. 4. Ready-made materials that are not available in the laboratory. 5. The management of the biology lab is assigned to the teacher and does not have a laboratory. 6. The implementation of high student mobility in practicum activities requires more attention from teachers.
5	Purnama, Pulungan, & Manik (2017) Prihastanti & Tristiyanto (2016) Litasari, Setiati, & Herlina (2014)	1.Limited laboratory funding budget. 2.Use of laboratories that become temporary classrooms. 3.Laboratory room that has changed its function to become a storage room for musical instruments and sports equipment. 4. Teachers do not understand how to use tools for practicum activities.
6	Agustina & Ningsih (2017) Rosdiana, Khuzaemah, & Gloria (2016) Hidayati (2013)	1. Inadequate availability of laboratory infrastructure. 2. The absence of special laboratory. 3. The biological laboratory building that is still integrated with the physics and chemistry laboratory. 4. Teachers sometimes find it difficult to manage the practicum schedule.
7	Nuada & Harahap (2015)	1. Inadequate facilities and infrastructure in some schools. 2. Limited knowledge and skills of teachers in managing practicum activities. 3. Biology learning outcomes are still low. 4. Teachers tend to teach biology in the classroom, thus exploring students' science process skills less.

8	Hasruddin & Rezeqi (2012)	1. Lack of tools or materials needed during practicum. 2. Limited time, especially study time in the classroom. 3. The usefulness of practicum materials that are not optimal in the school laboratory. 4. The laboratory room is used as a classroom and a student council/scout meeting room.

The articles obtained discuss the constraints that affect biological practicum activities as many as 22 articles. According to the Ministry of Education and Culture (2017), that the function of the laboratory can be as a place to conduct experiments and research, the laboratory should be able to support the implementation of learning activities. The obstacle that affects biological practicum activities is the biological laboratory room which is still joined by the physics laboratory and the chemistry laboratory. The use of laboratory rooms is not in accordance with their function, it is used as an additional classroom, as a religious study room, and even used as a student council or scout meeting room when the laboratory is not in use. There is no fixed practicum schedule. In addition, a biological laboratory room that is still integrated and used in a multifunctional manner can make it difficult to schedule practicum activities to be carried out.

The next obstacle that affects biological practicum activities, namely the limited equipment and materials in the biological laboratory can affect practicum activities. The limited equipment and materials in the laboratory are obstacles that should be overcome by the procurement of tools and materials. One of the efforts that can be done is to use props (KIT tools) be it simple props or modern props. One of the important elements in laboratory management is funding. The limited equipment and materials in the laboratory occurs due to the limited funds available.

One of the important elements in laboratory management is funding. The limited equipment and materials in the laboratory occurs due to the limited funds available. The budgeted funds are still insufficient for the purchase of damaged tools or materials that have been exhausted. Salabi (2016: 46) said that funding in MAN schools can come from madrasah budget implementation list (DIPA) funds or routine funds or madrasah committee dues. According to Hera (2017: 44), the source of funds in private schools is obtained from the local government, the allocation of BOS funds, the allocation of the International Standard School Pilot (RSBI) fund, foundations, donations from parents and donors.

Another factor that is an obstacle in practicum activities is the unavailability of laboratory personnel. Some research results show that laboratory energy is still not there. The standard for school / madrasah laboratory personnel based on the Regulation of the Minister of National Education No. 26 of 2008, one of the school laboratory personnel is the presence of laboratory personnel. Another obstacle that affects practicum activities comes from teachers.

The teacher teaches more by the method of lectures. Teachers also do not understand how to use practicum tools. According to Subamia et al., (2014: 453), many teachers are not satisfied if they do not provide or present as much information as possible to students. This makes the teacher the center of learning activities and less able to activate students. The impact is that students become inactive and tend to always only follow the teacher's direction. Therefore, the practicum method is very important to do in the laboratory.

CONCLUSION

The conclusion obtained from this study is that the facilities and infrastructure of biological laboratories in schools are mostly in accordance with the standards of Permendiknas No. 24 of 2007, although not all tools and materials are available in the laboratory. This type of utilization of biological laboratories in biology learning is used for the implementation of practicum activities, to improve learning outcomes and as a place to manage practicum tools and materials. Obstacles that affect biological practicum activities are the design of laboratory rooms that are not suitable, the unavailability of practicum schedules, limited practicum tools and materials in the biological laboratory, the unavailability of laboratory personnel, limited budget funds, and obstacles that come from teachers.

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