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Analysis of Laboratory Carrying Capacity in Supporting Biology Learning in State Madrasah Aliyah

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ABSTRACT

The study objectives are to 1) characterize the state of laboratory carrying capacity, 2) analyze laboratory utilization, and 3) identify the challenges and solutions to laboratory carrying capacity utilization. The descriptive qualitative research method was used. According to the research findings, the carrying capacity of laboratories in MAN A was in a moderate category with an average of 56%, MAN B was in a moderate category with an average of 58,5%, and MAN C was in a high category with an average of 65%. The overall carrying capacity of laboratories in MAN Cirebon was 59,8%. The use of laboratories to enhance biology learning has yet to be well implemented. The challenges in utilizing laboratory carrying capacity include inadequate facilities and infrastructure and ineffective management. The problem can be solved by submitting budget proposals to the principal and the school committee and requesting laboratory development funding support from the appropriate parties.

Analisis Daya Dukung Laboratorium dalam Menunjang Pembelajaran Biologi di Madrasah Aliyah Negeri

ABSTRAK: *Tujuan penelitian ini yaitu: 1) mendeskripsikan kondisi daya dukung laboratorium; 2) menganalisis pemanfaatan laboratorium; dan 3) mendeskripsikan kendala dan solusi yang dihadapi dalam pemanfaatan daya dukung laboratorium. Penelitian ini menggunakan metode penelitian deskriptif kualitatif. Tempat penelitian ini adalah di MAN A, MAN B, dan MAN C yang ada di wilayah Cirebon dengan subjek penelitian laboratorium dan guru biologi. Teknik pengumpulan data yang digunakan adalah observasi, wawancara dan dokumentasi. Analisis data menggunakan teknik perhitungan deskriptif persentase. Hasil temuan diperoleh bahwa daya dukung laboratorium di MAN A berada dalam kategori cukup baik dengan rata-rata 56%, MAN B dengan kategori cukup baik memperoleh rata-rata 58,5%, dan MAN C memperoleh rata-rata 65% dengan kategori baik, sehingga secara keseluruhan daya dukung laboratorium di MAN Cirebon dalam kategori cukup baik dengan rata-rata 59,8%. Pemanfaatan laboratorium dalam menunjang pembelajaran biologi masih belum terlaksana dengan baik. Kendala yang dihadapi yaitu fasilitas laboratorium masih belum memenuhi standar sarana dan prasarana serta pengelolaan yang belum optimal. Solusinya dapat diatasi dengan mengadakan pengajuan kepada kepala sekolah dan komite sekolah untuk dilakukan penyusunan anggaran dan permohonan bantuan dana pengembangan laboratorium pada pihak terkait.*

INTRODUCTION

Education is not static but rather dynamic, requiring ongoing improvement (Strom & Viesca, 2021). The realm of education has objectives that must be met during the learning process (Handoko et al., 2019). Education focuses not only on material mastery but also on skill mastery. Students must also be able to perform something utilizing mastered procedures and scientific concepts, and both learning to know and learning to do must occur in teaching and learning activities (Kuswanto et al., 2022);(Yang et al., 2021).

Learning biology is a platform for expanding knowledge, skills, attitudes, values, and environmental responsibility (Pratama et al., 2020). Biology is related to how to learn about nature methodically. Therefore learning biology is more than just memorizing facts, concepts, or principles; it is also a process of discovery (Wulandari, 2018). As a result, it is vital to employ a scientific technique, a practicum, when learning biology. Practicum activities are incorporated into the experiential learning method, giving students a direct learning theory experience (Diani et al., 2021).

The laboratory is one of the educational facilities that support the learning process, particularly those associated with practicum (Gunawan et al., 2019);(Pather et al., 2020). According to Government Regulation Number 32 of 2013, every educational unit must have infrastructure supporting an orderly and sustainable learning process, one of which is the laboratory room (Huda et al., 2019). The presence of a laboratory will allow the science education process to run as smoothly as possible. However, it does not indicate that science can only be taught in a laboratory (Khan et al., 2021).

The laboratory is a learning infrastructure that may help students grasp concepts and enhance their skills in conducting scientific experiments (Juanda et al., 2021). Thus, the concept of a laboratory comprises not only a structure with all of the necessary equipment and materials but also technicians, experts, libraries, other supporting facilities, and any learning programs or procedures (García-Vela et al., 2020). Laboratory activities are designed to improve cognitive, emotional, and psychomotor skills. Furthermore, laboratory activities can be utilized as a metric to determine the amount of theory obtained during the learning process (O'Donoghue, 2020);(Montoya et al., 2020).

Many elements influence the success of laboratory management in general, one of which is the availability of carrying capacity in the form of laboratory facilities and infrastructure that meet The Regulation of The Ministry of National Education Number 24 of 2007 criteria (Wahyudi, 2020). According to the research findings (Hayati & Sumarsih, 2020), the availability of laboratory instruments and facilities in the high school he researched did not match the government's minimal level of 62.7%, which has implications for the low quality of student learning outcomes. According to the study's findings (Anggereni et al., 2021), the carrying capacity of the science laboratory facilities and infrastructure in the high schools evaluated needed to satisfy the criteria, implying a low efficacy in utilizing laboratory space. This demonstrates that the accuracy of laboratory facilities and equipment in compliance with the government's minimal standards will undoubtedly impact the success of the biology learning process (Mukra et al., 2020).

Based on their early observations, the researchers discovered that the Madrasah Aliyah laboratory's buildings and equipment were insufficient and badly maintained. Schools need to utilize laboratories for practicum activities because biology learning is more typically done in the classroom than in the laboratory or outside the classroom, resulting in less than optimal utilization of these laboratories. This aspect, of course, can impact the implementation or number of biology practicum tasks

completed. Even if the practicum is not carried out in accordance with the demands of the syllabus, some learning objectives will be missed by students, which will have an impact on student learning outcomes. As a result, it is required to investigate the completeness of the carrying capacity in the form of laboratory facilities and infrastructure, the limits in employing the laboratory's carrying capacity, and alternative solutions that can be implemented.

METHODS

Because the research was conducted in natural settings, and the data were acquired based on objective field events, qualitative methods and descriptive analysis were employed in this study. The researcher is a primary instrument in the qualitative method, data analysis is inductive, and qualitative research outcomes stress meaning rather than generalization.

The study was carried out at the Cirebon State Aliyah Madrasah School, with samples taken from three schools: MAN A, MAN B, and MAN C. The research lasted around 1 (one) month, from March 14 to April 14, 2022, with a succession of actions beginning with research preparation. This study's data collection methods included observation sheets, interviews, and documentation.

The data analysis technique used is qualitative descriptive analysis, which is interpreted with interactive guidance and includes the following: 1) data reduction is carried out continuously by selecting, focusing, and simplifying the raw data from the results of data taken at the time of research following the research focus, 2) Data presentation is done by creating a model to explain the data, which can be in the form of a narrative, graph, or chart, 3) deriving conclusions and data confirmability. The source triangulation method and data-gathering procedures are used to test the data's validity (Wulandari & Djukri, 2022).

Sugiyono uses the following formula for the descriptive analysis of percentages (Sugiyono, 2017).

$$\% = \frac{n}{N} x\ 100$$

Description:
n = The score obtained by the respondent
N = The maximum score of the respondent
% = Percentage

The descriptive analysis results were then evaluated using the percentage descriptive criteria table, which was subsequently interpreted with qualitative phrases.

Table 1. Interpretation of Biology Laboratory Data Analysis Results

Interval	Assessment Level Criteria
81% - 100%	Excellent
61% - 80%	High
41% - 60%	Moderate
21% - 40%	Low
< 20%	Poor

Source: (Riduwan, 2015)

RESULTS AND DISCUSSION

A. Laboratory Carrying Capacity in Supporting Biology Learning

Table 2 shows the findings of observations of laboratory carrying capacity conditions at MAN Cirebon following laboratory standards defined in Minister of National Education Regulation Number 24 of 2007.

Table 2. The Percentage of Laboratory Carrying Capacity Aspects

No	Schools	Assessed Aspects: Laboratory and Equipment	Laboratory Administration	Laboratory Organogram Structure	Practicum Equipment Tools and Materials	Average	Description
1.	MAN A	71%	45%	50%	58%	56%	Moderate
2.	MAN B	68%	45%	60%	61%	58,5%	Moderate
3.	MAN C	64%	73%	60%	64%	65%	High
Rata-rata		67,7%	54,3%	56,7%	61%	59,8%	Moderate

Table 2 shows that, compared to laboratory standards, the average carrying capacity of the biology laboratory achieves a value of 59.8% in the moderate category to support biology learning. It indicates that the laboratory's carrying capacity at MAN Cirebon needs to be fully following the predetermined standards, namely reviewing the four aspects observed based on Minister of National Education Regulation No. 24 of 2007. Each aspect is described and discussed more below.

1. Laboratories and Their Equipment

The final percentage obtained from the observation sheet for the laboratory aspect and its equipment shows that MAN A receives 71% in the high category, and MAN B receives a percentage of 68% in the high category. MAN C receives a percentage of 61% in the high category, indicating that there are still several indicators that have not been met under the Standards of Facilities and Infrastructure for Senior High Schools/Madrasah Aliyah.

The similarity and differences in the indicators owned by the three schools analyzed can be used to examine the variety of these percentages. The presence of a biology laboratory, practicum area, clean water facilities, ventilation, open doors, student and instructor chairs, practicum tables, teacher's desks, tool cabinets, and sinks are all indicative. The physics laboratory and preparation desk in MAN A, hanging cupboards and cabinets in MAN B, as well as the practicum room and storage room that only MAN A and MAN B have, are the only differences in signs that only one school has.

The laboratory in MAN A already has its room. However, the area and student capacity need to be improved and appropriate. At MAN B, the biology laboratory is still joined by the chemistry and physics laboratories and the MAN C biology laboratory, which is still integrated with laboratory physics. When the number of laboratory rooms accessible to study groups is considered, it is still insufficient because it is used for a variety of disciplines, whether biology and physics or all three, namely biology, physics, and chemistry.

Fitriani (2021) specifies that the laboratory space where laboratory equipment, such as tables, seats, cupboards, and shelves, is 100 m2, including the preparation room and warehouse. This area is calculated based on the fact that the laboratory is used by 40 students, which means that each student takes up around 2.0-2.5 m^2 of space. As a result, the laboratory size should be proportionate to the available equipment. According to Arnold (2019), every individual who performs laboratory tasks must be free and able to move. Keep the laboratory from being crammed with different equipment yet unable to accommodate users due to the number of equipment. This could impair the efficiency of laboratory use.

Laboratory room indications are only available at MAN A and MAN B schools, which have a practicum room and a storage room, whereas MAN C schools only have a practicum room. As a result, some biology laboratory rooms at MAN Cirebon do not meet the planned criteria. According to (Pertiwi, 2019), a laboratory must be strategically located, have facilities to support teaching and learning activities, and have appropriate space for learning activities such as practicum rooms, preparation rooms, storage rooms, and warehouses.

2. Laboratories Administration

According to the study's findings, the final percentage of laboratory administration for MAN A and MAN B was 45% in the moderate category and 73% in the high category for MAN C. Thus, in terms of laboratory administration indicators, the average laboratory carrying capacity falls into the moderate category. The similarity and differences in the indicators owned by the three schools analyzed can be used to examine the variety of these percentages. The presence of a laboratory equipment

inventory book, a card for borrowing equipment/materials, a journal, a timetable for laboratory activities, and monthly reports are all signs in common. Damaged equipment/material cards, the semester program for laboratory activities, and a list of tools and materials at MAN C are the distinctions in indications that only one school has.

The administration is required in the laboratory so that everything required in the laboratory, both in the form of public and special facilities, can be made available in line with the current administration. According to the literature review(Gustini & Wulandari, 2020), laboratory equipment inventory books, stock cards, equipment/material request/borrowing cards, daily logbooks, damaged equipment/material cards, repairs, labels, semester program of laboratory activities, list of tools and materials, schedule of laboratory activities, and monthly reports are among the aspects that must be administered in the laboratory.

According to Ilyas (Ilyas, 2021), numerous notebooks are required for administrative purposes, including stock books, product cards, purchase books, loan books, and journals. These records are critical for school needs, such as planning for the biology laboratory for the coming year and preparing the school's annual report. Administering practicum tools and materials aims to make it simple to know the types of tools and materials available, the number of tools and materials, the number of reductions and additions, and the number of damaged/broken/lost and used-up tools and materials.

3. Organogram Structure of Laboratories

According to the study's findings, the final percentage of the laboratory organigram structure for MAN A was 50% with a moderate category and 60% for MAN B and MAN C with a moderate category. Thus, in terms of laboratory organizational structure metrics, the average laboratory carrying capacity is in the moderate category. The similarity and differences in the indicators owned by the three schools analyzed can be used to examine the variety of these percentages. These indicators are comparable: they all have school principals, deputy principals for facilities and infrastructure, curriculum vice principals, and biology teachers. Teacher discipline is a difference in indications that only some schools have at MAN B and MAN C.

Biology professors manage laboratory activities at MAN Cirebon without the assistance of laboratory coordinators, laboratory assistants, laboratory technicians, or laboratory technicians. Meanwhile, (Komalasari et al., 2020) state that the organizational structure required in a laboratory includes the school principal, vice principal in curriculum matters, vice principal in infrastructure, laboratory coordinator, laboratory technician in charge, laboratory assistant, laboratory technician, and subject teacher. The existence of an organizational structure is critical, but if the components of the organizational structure are missing, the goals stated may need to be met optimally. Furthermore, an organization will only function if employees in the structure carry out their responsibilities as they should.

4. Tools and Equipment for Practicum

Based on the research findings, the laboratory's carrying capacity has a final percentage that varies in each component. MAN A has 58% in the moderate category for equipment and practical materials, MAN B has 61% in the high category, and MAN C has 64% in the high category. Thus, the laboratory's average carrying capacity falls into the high category in terms of equipment and practical materials.

The study found that the educational equipment in MAN Cirebon obtained an excellent category for the indicators of educational equipment, which include teaching aids and experimental material tools. However, sub-indicators in the form of representations of people and animals' respiratory, digestive, circulatory,

neurological, and reproductive systems (reptiles, amphibians, and fish) were only partially available and adequate in all of the schools evaluated. Hielganingsih (2021) explains that educational equipment in the Biology laboratory, with a percentage of 62.14%, indicates the profile of seven schools in the high category. However, some instructional equipment that facilitates learning still needs to be standardized or completed in S-3, S-5, and S-6 schools. Observational data also suggests that the upkeep of laboratory instructional equipment in certain schools needs to be effectively maintained.

Based on the research findings on educational media indicators at MAN Cirebon, they are in the excellent category and meet the standards established by The Regulation of the Ministry of National Education No. 24 of 2007. Langngan et al., (2021) claim that in the Analysis of Laboratory Standardization in the Learning Process at Denpasar City State High School, the blackboard facilities in the Science/Biology laboratory room obtained 100% of the data. The finding indicates that the educational media facilities in Denpasar Public High Schools met the minimum standards in The Regulation of the Ministry of National Education No. 24 of 2007. The Cirebon MAN laboratory uses educational media in addition to blackboard media and, sometimes, a projector.

Laboratory supporting equipment is a tool that is not required in the laboratory but must be present to assist or complement other tools. The percentage of laboratory supporting equipment in the high category was calculated using study data from MAN Cirebon. In contrast to Anggereni et al., (2021), additional laboratory equipment on indicator 5 explained that seven schools were in the excellent category (86.00%). Trash cans, clocks, and other items have been given in the laboratory. Numerous laboratory equipment, such as fire extinguishers, electric outlets, and clocks, still need to be made available at MAN Cirebon. First aid supplies, such as open wound kits and first aid kits, are available. Still, they need to be more. According to the interviews, some have expired because there has never been a significant mishap, such as a burn.

According to The Regulation of the Ministry of National Education, this equipment is required for practitioners or students undertaking practicum to ensure their safety and cleanliness and to assist students in determining how long the practicum would take in the laboratory. Furthermore, (Wahyudi, 2020) stated that scientific laboratory equipment, while not research instruments and materials, must be carefully managed since it affects the smoothness and efficacy of laboratory activities.

A consumable substance is damaged or becomes consumable after several uses, or one that has a short life and is not durable. Observations revealed that not all MAN schools studied in Cirebon had complete consumables. Several ingredients, such as glucose, MnSO4, BTB, PP, ethanol, and eosin, are unavailable and have yet to be supplied according to needs. According to research (Pertiwi, 2019), consumables receive a percentage of 98%, indicating that current consumables facilities do not satisfy the standards set in The Regulation of the Ministry of National Education No.24 of 2007.

B. Laboratory Utilization in Supporting Biology Learning

The research results in a documentation study related to laboratory utilization are presented in Table 3.

Table 3. Results of Laboratory Utilization Data Analysis at MAN Cirebon

No.	Indicators	MAN A	MAN B	MAN C
1	Laboratory journal	✓	✓	✓
2	Inventory book of tools and materials	✓	✓	✓

No.	Indicators	MAN A	MAN B	MAN C
3	List of student practicum attendance	✓	-	✓
4	List of tools and materials following the student worksheet	-	-	✓
5	List of tools and materials used	-	-	✓
6	Photos of laboratory activities	✓	-	✓
7	Practical schedule	✓	✓	✓
8	Stock card	-	-	-
9	Damaged tools and materials card	-	-	-
10	Borrowing cards for tools/materials	-	✓	✓
11	Student practicum card	✓	-	-
12	Tool repair card	-	-	-
13	Label	-	-	-
14	Monthly report	✓	✓	✓
15	Laboratory activity semester program	-	-	✓

Based on Table 3, it is clear that the efficacy of laboratory use at MAN Cirebon has not been optimized because some indications still need to be fulfilled. There were no stock cards, damaged equipment, materials cards, repair cards, or labels, as was the situation in the three schools reviewed. In MAN A and MAN B, there is no list of tools and materials that comply with the student worksheet, a list of tools and material use, and a semester program. Practicum cards and attendance records still need to be available in MAN B and MAN C, and images of practicum activities are currently out of stock in MAN B.

According to the findings of the interviews, the factors for the indicators not to be met are a shortage of laboratory staff, which increases the teacher's teaching load, the teacher's insufficient knowledge of laboratory administration, and a lack of support from the school. According to Saifuddin & Puspitasari (2022), the restricting factors in the utilization of laboratories are insufficient school support, a lack of laboratory management, teacher factors that lack preparedness, and conducting practicums without the assistance of laboratory assistants or laboratory technicians. Similarly, Wahyudi (2020) asserts that a lack of laboratory facilities, a lack of facilities and infrastructure to support laboratory activities, and a lack of readiness of teachers and laboratory assistants to master basic laboratory techniques are practical and laboratory-related obstacles.

Efforts made by teachers to overcome these factors can include participation in training on the use of science laboratories, increasing student interest in practicum, specifications for teacher assignments, optimizing the use of facilities and infrastructure, and increasing the availability of tools and materials. Anggereni et al., (2021) stated in their research that 39% of teachers still had insufficient expertise in practicum, and 34% had never attended laboratory usage training. So, in this scenario, the remedy is to increase instructor performance by engaging in various laboratory pieces of training. Furthermore, according to (Nuriah, 2022), the teacher's capacity to supervise students in practicums must still be evaluated, and training in specific laboratory instructions must be provided.

The efficacy of laboratory utilization assesses how well the school can use the laboratory by incorporating laboratory operations into practicum activities. Using the laboratory effectively entails meeting the goal of enhancing biology learning to reach optimal competency. In the meantime, the laboratory usage criteria measured by (Farida et al., 2021) are as follows:

1. Laboratory Usage Frequencies

Based on observations and data, it is clear that the biology laboratory at MAN Cirebon already has a schedule for laboratory use. However, based on the findings of the interviews, it is clear that the frequency with which the laboratory is used at MAN Cirebon is insufficient because the laboratory is only sometimes used weekly. The average practicum implementation in each class is only done twice in one semester, as evidenced by laboratory diaries. At the same time, the biology laboratory is used effectively four times in one semester. The utilization of the biology laboratory is tailored to the resources, tools, and materials available.

2. Equipment and Laboratory Materials

Based on the findings, it is clear that the instruments and resources in the MAN Cirebon biology laboratory still need to be improved for facilitating learning in madrasas because they do not meet established standards. This finding is consistent with the interview findings, which revealed that the most difficult aspect of performing practicum is a lack of necessary equipment and materials. However, this is not a major barrier because students can overcome it by bringing their equipment and supplies that allow them to conduct practicums. This is also evident from laboratory equipment inventory data, which demonstrates that instruments and materials still need to be made available or fixed.

3. Compatibility of the Equipment in the Laboratory with the Material Being Practiced

Based on the findings of the interviews, it is clear that the tools in the biology laboratory are extremely related to the materials practiced in the worksheets. Tools and materials are checked in an inventory draft before the start of the new school year. Despite a lack of instruments and materials, the biology laboratory can help students learn.

4. Sufficient Time Allocation for Practicum

The time allotted in the laboratory schedule for each class can impact the effectiveness of laboratory utilization. This is because it is common for students to have to wait for the schedule to enter the laboratory due to the conditions and conditions of the laboratory that are not in compliance with the standards. Supported by the findings of the interviews, which revealed that the allocation for conducting practicums was sometimes insufficient, despite the existence of a special schedule for laboratories that were not carried out regularly, potentially interfering with study time for other subjects, particularly for laboratories that were still unified.

Based on the findings of the observations, interviews, and data presented above, it is clear that the biology laboratory at MAN Cirebon needs to be used to its full potential in supporting school-based learning. This is evident from the practicum implementation, which needs to fulfill the minimal laboratory use criteria established by the Ministry of National Education Regulation No. 24 of 2007. There still needs to be more equipment and materials available in the laboratory to facilitate learning in schools. It is appropriate and supports the learning process in schools regarding the compatibility of the instruments and resources available in the laboratory with the topic to be taught. Furthermore, the time allotted for practicum is claimed to be insufficient for biology practicum.

C. Obstacles and Solutions in Utilizing Laboratories

The following table details the identification of obstacles in utilizing laboratory carrying capacity at MAN Cirebon based on the findings of interviews with biology teachers from each school.

Table 4. Obstacles to the Utilization of Laboratory Carrying Capacity at MAN Cirebon

No	Obstacles	MAN A	MAN B	MAN C
1	Incomplete tools	✓	-	✓
	a. Damaged			
	b. Lost	-	-	✓
	c. Unavailable	✓	✓	✓
2	Inadequate tools and experimental materials	✓	✓	✓
	a. Damaged	-	-	-
	b. Lost			
	c. Unavailable	✓	✓	✓
3	Inadequate laboratory support equipment	✓	✓	✓
	a. Damaged			
	b. Lost	-	-	-
	c. Unavailable	✓	✓	✓
4	The area of the laboratory that does not meet the standards	✓	✓	✓
5	Inadequate laboratory furniture	-	✓	✓
6	The laboratory is still integrated with other laboratories.	-	✓	✓
7	Lack of time allocation in conducting practicum	✓	✓	✓
8	Lack of laboratory assistants	✓	✓	✓

According to this description, the common obstacles faced by all schools are insufficient teaching aids, insufficient experimental tools, and materials, a laboratory area that does not meet standardization, laboratory supporting equipment such as only one power socket available, no laboratory assistant, and a lack of time allocated for practicum implementation. The three schools' obstacles differed in that MAN B, and MAN C had issues with laboratory furniture, but MAN A had enough laboratory furniture. Furthermore, the laboratory rooms in MAN B and MAN C are still connected with other laboratories, although they are separated in MAN A.

1. Incomplete Tools

Visual aids play a significant part in assisting pupils in understanding the subject being taught. According to the data, not all sample schools had instructional aids in compliance with standards. Some of the instructional aids were broken, misplaced, or were not even in the laboratory. To circumvent this issue, the teacher or students can create their own easier teaching aids, which can also be aided by displaying visuals on PowerPoint.

2. Inadequate Experimental Tools and Materials

The findings in all madrasah samples concerning experimental tools and materials did not conform to standards. Several tools are in unusable condition, while others pose a risk of being utilized for an extended time. This condition has the potential to impede the continuous execution of the practicum.

The approach is to hunt for alternate equipment and materials that students can bring or carry out basic demonstrations. Sunandar et al., (2020) suggest that the demonstration method can be used as a substitute for experimental and practicum methods in the classroom by employing demonstration principles and demonstrating how a technique or process works. Another option is for the laboratory head to collect data on the necessary experimental tools and supplies and submit it to the school. According to Trasmini et al., (2021), the school, through related agencies, can meet the needs of school laboratories in terms of the availability of tools and materials for practicum needs and laboratory staff, as well as carry out training to improve teacher professionalism, particularly among laboratory managers. Virtual laboratories can also overcome the limitations of restricted laboratory space. According to Handoko et al., (2021), the benefits of virtual practicum discovered in their research include the ability to increase

the effectiveness of learning so that learning is more interesting and interactive, save time, improve learning quality, make it easier for students to practice abstract concepts, and be used repeatedly without the need to prepare tools and materials.

3. **The Area of the Laboratory Does Not Meet the Standards**

The laboratory area also needs to meet the minimum specifications: a ratio of 2.4 m/student. The minimal laboratory space ratio in MAN A is 2.04 m/student, while in MAN B and MAN C is 2.1 m/student. Based on the results of interviews, the solution to this problem is to temporarily rearrange the layout of the laboratory room so that students have more room to walk because of the integration of the practicum room, storage room, and preparation room.

4. **Inadequate Supporting Equipment**

The supporting equipment in all of the sample schools analyzed was subpar. A damaged fire extinguisher, a first aid pack, and an electric socket, of which only one is available, are among the components that are not currently available. Based on the results of the interviews, the answer to this problem is to submit a tool or discover an alternative to using a not-yet-available tool, such as a power socket that can be substituted with a terminal.

5. **Incomplete Laboratory Equipment**

According to field findings, numerous schools need more preparation and presentation tables and more than one sink. This position can impede practicum implementation and restrict space for students to clean up used tools because all students use one or two sinks on the side of the room, increasing the danger of accidents in the form of broken tools.

Based on the results of the interviews, the solution to these difficulties is to temporarily replace the preparation table and demonstration table with the teacher's table or student practicum table. A laboratory, according to Adilah et al., (2021), should feature a permanent demo table or practice table supplied with clean water supply facilities and a washing tub. Other solutions to these challenges can be communicated to school principals and school committees regarding concerns with laboratory facilities and infrastructure for budgeting and submitting requests for laboratory development funding to related parties (Saifuddin & Puspitasari, 2022).

6. **Laboratories That Are Integrated with Other Laboratories**

Biology laboratories separate from other laboratories are only found in some of the school samples evaluated. There are still a few State MAs that still need a separate biology laboratory, such as MAN B and MAN C, which means that chemistry, biology, and physics practicum activities are carried out in the same laboratory space. If practicum schedules from other classes are carried out concurrently, this condition can disrupt laboratory activity.

Based on the results of the interviews, a temporary solution to this problem, namely creating a schedule for laboratory operations, can be implemented. It should be able to give a scientific laboratory independent of the chemistry, biology, and physics labs. According to The Regulation of the Ministry of Education and Culture Number 34 of 2018, SMA/MA should include three science laboratories, including chemistry, physics, and biology laboratories.

7. Lack of Time Allocation

The following step is that the time allotted for the biology practicum needs to be increased. This occurs because instructional plans need to be in compliance with the educational calendar, resulting in a lack of time during practicums. According to Ilyas Ilyas (2021), the time allocation that has been set based on the school calendar frequently changes, such as changes to national exams, changes to vacation time, and numerous other unexpected events. Furthermore, the time allotted for biology study is different from the fundamental skills that must be taught. The practice must

be carried out more adequately as a result of this.

The problem can be solved if educators carefully control the time allocation for the various phases of learning. This issue can also be solved if the teacher and laboratory assistant prepare practicum need before the session, allowing them to save time during practicum (Farida et al., 2021). Furthermore, based on the findings of the interviews, the teacher frequently provides additional time before school hours if there is insufficient time to complete the practicum.

8. Unavailable Laboratory Assistants

The absence of laboratory assistants or technicians negatively influences laboratory upkeep and causes the time available for carrying out biology laboratories to be limited or insufficient. To achieve satisfactory results in school laboratory maintenance, school principals or the appropriate Education Office should develop policies and pay attention to recruiting laboratory assistants/laboratory technicians. According to Ministry of National Education Regulation No. 26 of 2008, one of the laboratory assistant's roles is to arrange equipment according to practicum requirements and assist students in practicums. This demonstrates how the laboratory assistant assists the teacher in preparing practicum tools and materials and putting the tools back in position.

CONCLUSION AND SUGGESTION

The following conclusions can be drawn based on data analysis in supporting biology learning with laboratory carrying capacity at MAN Cirebon.

1. Laboratory carrying capacity in MAN A is in the moderate category with an average of 56%, MAN B in the moderate category with an average of 58.5%, and MAN C in the high category with an average of 65%. The laboratory at MAN Cirebon has a moderate overall carrying capacity, with an average of 59.8%.
2. The use of laboratories to enhance biology study still needs to be fully applied. Various indicators have yet to be reached, such as the practicum implementation not meeting the minimal standards for laboratory use, a lack of laboratory instruments and resources, and insufficient laboratory administrative management data.
3. Obstacles encountered in utilizing laboratory carrying capacity, notably laboratory facilities that still need to fulfill facility standards and infrastructure and administration that are not yet optimal. The problem can be solved by submitting budget requests to school administrators and school committees and requesting financing for laboratory development from connected parties.

Researchers recommend that every school have appropriate laboratory administration in place so that practicum activities can be carried out properly and efficiently. Furthermore, biology teachers are anticipated to be able to work on existing laboratory room facilities and function effectively so that creative, active, and inventive learning processes can be ideal when considered in terms of management quality and intensity of space utilization. Further research is required to develop and strengthen the research findings by examining students' responses to the application of biology learning with the carrying capacity of the laboratory.

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