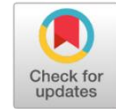


Research Article

Laboratory hands-on activity: A case study in senior high school of Pekanbaru-Indonesia

Maysi Hidayah Ramadhani ^{a,1}, Prima Wahyu Titisari ^{a,2,*}^a Department of Biology, Faculty of Education, Universitas Islam Riau, Jl. Kaharuddin Nst, Simpang Tiga, Pekanbaru, Riau 28284, Indonesia¹ maysihidayah@gmail.com; ² titisari.pw@gmail.com*

* Corresponding author



ARTICLE INFO

Article history

Received May 15, 2019

Revised June 18, 2019

Accepted June 22, 2019

Published June 30, 2019

Keywords

Laboratory hands-on activity

Science process skill

Thinking skills

ABSTRACT

The issues arise in performing laboratory hands-on activity are: the less frequency in its implementation, the lack of students' interest, the limited in time, and lack of preparation. By considering the importance of laboratory hands-on activity, it is necessary to examine the conditions of the hands-on activity in school whether the activity has been in accordance with the existing rules and standards. This study aimed to determine the implementation of biology hands-on activity in students' grade XI of SSHS 10-Pekanbaru. The population in this study was 144 students. The sampling technique used were Slovin formula and purposive sampling, in which the sample was 60 students of class XI MIPA-1 to MIPA-4. The instruments used to collect the data in this study were questionnaires, observation sheets, and interviews. The results showed that the for 4 indicators observed (i.e. hands-on activity intensity, students' interest in hands-on activity, hands-on activity duration, and hands-on activity preparation) reached the percentages between 76.14% and 80.66%, which were in the good category. Thus, it can be concluded that this school has been conducting a good hands-on activity. It is suggested for further researchers to focus on problems analysis and alternative solutions.



Copyright © 2019, Ramadhani & Titisari

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license

How to cite: Ramadhani, M. H., & Titisari, P.W. (2019). Laboratory hands-on activity: A case study in senior high school of Pekanbaru-Indonesia. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 5(2), 253-268. doi: <https://doi.org/10.22219/jpbi.v5i2.8457>

INTRODUCTION

Education for human life is an absolute necessity that must be fulfilled throughout life. Without education, humans cannot develop at all in line with their aspirations to progress, prosper, and be happy according to the concept of their outlook on life. One of the functions of education is to help the physical and spiritual development of the students. Education is very important to consider because it can open up the potential possessed by students and also can help them to better understand the world and to overcome complex problems that are being faced, education can also be able to change one's outlook for the better. Good education is education that utilizes all aspects of its scope including the use of innovative technology and existing infrastructure. Education is very much needed to support human life to meet current demands,

education can also improve one's self quality, education can be obtained anywhere, and in education requires a learning process one of which is the process of learning biology (Kilinc, Demiral, & Kartal, 2017; Lawson, Cakmak, Gunduz, & Busher, 2015; Mena, Garcia, Clarke, & Barkatsas, 2016).

Biology learning is a vehicle for increasing knowledge, but also the skills of attitudes and values and responsibilities to the environment. Biology is concerned with how to find out about what happened in nature and what is contained in nature systematically, so that biology learning is not only mastery of collections of knowledge in the form of facts, concepts or principles, but also a process discoveries that must be made by students (Hamidah, Sari, & Budianingsih, 2014), and for the implementation of biology learning, it can not only be done in the classroom, but the characteristic of biology learning is laboratory hands-on activity both in the laboratory and in nature (Kokkinos, Stavropoulos, & Davazoglou, 2016; Sadjati & Pertiwi, 2013; Siburian, Sinambela, & Septie, 2017). Many biological concepts that allow students to understand the concept and practical activities are one form to facilitate students to learn through direct experience. One effort to facilitate students in learning biology through direct learning experience is by using practical activities (Hansmann, 2009; Supliyadi, Baedhoni, & Wiyanto, 2017; Tillema, Smith, & Leshem, 2011). Practical activities can be interpreted as a series of activities that allow students to apply skills or practice something. The practice is a learning experience that makes students interact with the tools and materials that exist to the observation of the activity activities that are in it. Practical activities can be carried out alone or in groups, in the laboratory or outdoor. Laboratory hands-on activity has a very important role in learning science. Through laboratory hands-on activity, students have the opportunity to develop and apply science process skills, understanding, and scientific attitudes to gain knowledge (Dewi, Sunariyati, & Neneng, 2014; Hayati, Bintari, & Sukaesih, 2018; Husna, Ngabekti, & Abdullah, 2018; Martins, Costa, & Onofre, 2015)

The laboratory hands-on activity can be used to train the skills needed by students, namely: (1) providing opportunities for students to apply and integrate the knowledge and skills they have in practice; (2) prove something scientifically; (3) appreciate the knowledge and skills possessed (Indriastuti, Herlina, & Widiyaningrum, 2013). Laboratory hands-on activity are carried out in order to support the achievement of learning objectives set in the curriculum. Through practical activities, students can understand about biology subject matter (Lee, Liosa, Haas, Connor, & Booven, 2016; Ratmini, 2017). Practical activities are one of the important processes in achieving learning goals from psychomotor aspects. If the laboratory hands-on activity process is not carried out, of course the learning objectives of psychomotor aspects cannot be achieved by students, and this can later affect student learning outcomes in school. The function of the laboratory hands-on activity approach is to provide interaction between teacher and students, develop thinking skills, and provide opportunities for students to interact directly with the world of biology (Davies & Heyward, 2019). According to Gürsoy, (2013), to find out the quality of laboratory hands-on activity used in practical activities, 2 important factors are needed, namely: the time of student laboratory hands-on activity implementation, and preparation and implementation of practices. Most studies only focus on practical facilities and infrastructure, not on practical activities.

The problem examined in this study is how the condition of the biology laboratory in supporting practicum activities in the school so that the practicum runs well. Problem solving from this research is if laboratory equipment used for practicum implementation is not complete then the equipment will be replaced by other equipment with the same function or that can be used for practical activities. Previous research conducted by Kahar, (2018) only discussed analyzing facilities and using their laboratories only in Kaduna State, Nigeria, this study has not discussed the implementation of practicums, only discussing laboratory facilities and facilities for learning only, the purpose of this study is to see how the facilities and utilization of laboratories have been utilized properly. Research conducted by Khamidah and Aprilia, (2014) this study only discusses evaluations that exist in research on laboratory facilities on student performance in science subjects in Machakos District, Kenya. This research is limited to only discussing laboratory facilities that have not discussed implementation, and the purpose of this study is to see whether there is a relationship with laboratory facilities with improving student abilities. Furthermore, the focus of the research conducted by Rahmi and Sasmita, (2018) only discusses the readiness of laboratories for practicum management only in North Tapanuli. This study was only limited to preparation laboratories that were not in practice, this study agreed to see whether the readiness of laboratories in this area was available or not. The purpose of this study is only to study laboratory readiness.

On the other hand, there are studies conducted by Afifah and Astuti, (2017) and Atnur, Lufri, and Sumarmin, (2015) which only discusses evaluation of laboratory conditions in students' scientific processes, the limitations of this study are only on laboratory conditions in the science process, therefore this study aims

to look at the influence of scientific processes in the laboratory, and research to see whether there are developments in laboratory conditions for the process scientific students. Furthermore, the research conducted by [Hasruddin and Rezeqi, \(2012\)](#) only supports the quality of laboratories in Surakarta and this research is limited to quality but has not discussed the practice. Therefore, this study examines the quality of laboratories in Jakarta, and the purpose of this study is to see or whether or not a quality laboratory is in the teaching and learning process. But this research focuses on practical activities. So, the objectives of this research are to determine whether biology laboratory hands-on activity has been carried out properly and optimally in class XI MIPA SSSHS 10 Pekanbaru.

METHOD

This type of research is quantitative descriptive research. The population in this study were senior high school students of grade XI, class MIPA 1 until MIPA 4 in the 2018/2019 academic year at SSSHS 10 Pekanbaru, totaling 144 students. The sample was taken by purposive sampling using the Slovin formula so that the sample amounted to 60 students. The Slovin formula in [Formula 1](#). In the formula, n is sample size / number of respondents, N is population size, E is percentage of accuracy of sampling errors that can still be tolerated; $e = 0.1$.

$$N = \frac{N}{1 + N(e)^2} \quad (1)$$

To obtain the required data, the instruments used in this study consisted of questionnaires, interviews, and observation sheets. All students acting as respondents will be given a questionnaire, and will also be interviewed. The questionnaire used was a closed questionnaire consisting of 52 questions, where 52 questions consist of various indicators that will be examined and processed. The questions on each indicator can be seen in the [Table 1](#).

Table 1. Total questions for each indicator

No	Indicator	Total of questions
1	The intensity or frequency of laboratory hands-on activity implementation	8
2	Student interest in practical	16
3	Implementation time for laboratory hands-on activity	8
4	Preparation laboratory hands-on activity	20
Total		52

Each statement is provided with an answer option that becomes an alternative answer. Assessment in this study uses a Likert scale, the scale is used to measure attitudes, opinions, and perceptions of a person or group of people about a social phenomenon. Each item answer from the questionnaire contains 4 choices, namely: Strongly Agree, Agree, Slightly Agree, and Disagree.

Interviews were conducted by students and teachers; interviews were conducted to find out what could not be explained through the questionnaire and to support the preparation of the questionnaire. The observation sheet includes: observations on the implementation of biology laboratory hands-on activity in class XI SSSHS 10 Pekanbaru in the 2018/2019 academic year. The data analysis technique in this study uses qualitative data analysis techniques from the results of document study analysis and interview results described by summarizing the results. Assessment data obtained from student questionnaires were analyzed using percentage techniques using the [Formula 2](#). In that formula, P is percentage number, F is frequency the percentage is sought, N is number of cases (Number of frequencies or many individuals) ([Agustina, 2015](#)).

$$P (\%) = \frac{F}{N} \times 100 \quad (2)$$

The criteria for interpreting the questionnaire have been processed, qualitative data analysis techniques used can be seen in [Table 2](#).

Table 2. Criteria for interpretation of questionnaires

Percentage (%)	Category
85 – 100	Very good
84 – 69	Good
68 – 53	Enough
52 – 37	Less
36 – 21	Very less

RESULTS AND DISCUSSION

The results of laboratory hands-on activity research in biology learning in class XI MIPA SSSH 10 Pekanbaru on each indicator can be seen in the [Table 3](#).

Table 3. Indicators of laboratory hands-on activity implementation in biology learning in class XI MIPA SSSH 10 Pekanbaru

No	Indicator	Percentage (%)	Category
1	The intensity or frequency of laboratory hands-on activity implementation	76.14	Good
2	Student interest in practical	82.93	Good
3	Implementation time for laboratory hands-on activity	79.58	Good
4	Preparation laboratory hands-on activity	80.66	Good
Total		319.31	
Average		79.82	
Practical implementation			Good

The results of this study are the same as the results of previous studies, namely research [Muliadong, Affiah, and Karno, \(2016\)](#) shows that the application of biology laboratory hands-on activity at SSSH 1 obtained an average value of 85.22% and the implementation of laboratory hands-on activity at SSSH 2 obtained an average value of 74.99% with sufficient criteria. According [Siburian, Sinambela, and Septie, \(2017\)](#) showing that the equipment in the laboratory is quite good at 58%, the allocation of time during the laboratory hands-on activity is quite good with a percentage of 58.8%, good use of time when practicing with a percentage of 62.9%, understanding work procedures when laboratory hands-on activity is included in the good category with a percentage of 71.9%, making the laboratory hands-on activity report included in the good category with a percentage of 73.43% and the teacher submitting the laboratory hands-on activity included in the excellent category with a percentage of 85.62%.

The percentage distribution on each indicator of laboratory hands-on activity in the biology learning class XI MIPA SSSH 10 Pekanbaru which includes 4 indicators, namely: intensity or frequency of laboratory hands-on activity implementation, student interest in laboratory hands-on activity, implementation time for laboratory hands-on activity, and preparation laboratory hands-on activity.

Based on [Figure 1](#), it can be seen that the indicator of the intensity or frequency of the laboratory hands-on activity is at a percentage level of 76.14% and is included in the good category. Before laboratory hands-on activity, a teacher must ensure the presence or absence of tools and materials during the lab. This is in line with the study of [Grudnoff, Haigh, and Mackisack, \(2017\)](#) facilities and infrastructure are important things that support the implementation of practical activities. This is in line with the results of this study that readiness before laboratory hands-on activity has a large influence on laboratory hands-on activity intensity. On the indicator of the intensity or frequency of lab work, there are 8 items of statements. The statement is more detailed below.

The item 1 "Laboratory hands-on activity statement is done every day", most respondents chose answers that disagree with the frequency of 39 students with a percentage of around 65%. The answers slightly agree and with the frequency of answers to these students around 13 students or about 21.66%. The answered by students is the answer to agree with the frequency of around 7 students or around 11.66%, and followed by answers that strongly agree with 1 student or around 1.66%. The percentage of the statements is around 48.33%, where the percentage is in the less category. Item statement 2 "The teacher provides a specific schedule for laboratory hands-on activity" most respondents choose answers agree with the frequency of 29 students with a percentage of around 48.33%. The most answered the next is the answer strongly agree, where the answers strongly agree the frequency of students who answer about 21 students or about 35%. The answered by students are slightly agree answers with a frequency of around 10 students or around

16.66%, and followed by disagree answers, next answer with 4 students or around with frequency 6.66%. The percentage of statements is around 81.25%, which is in the good category.

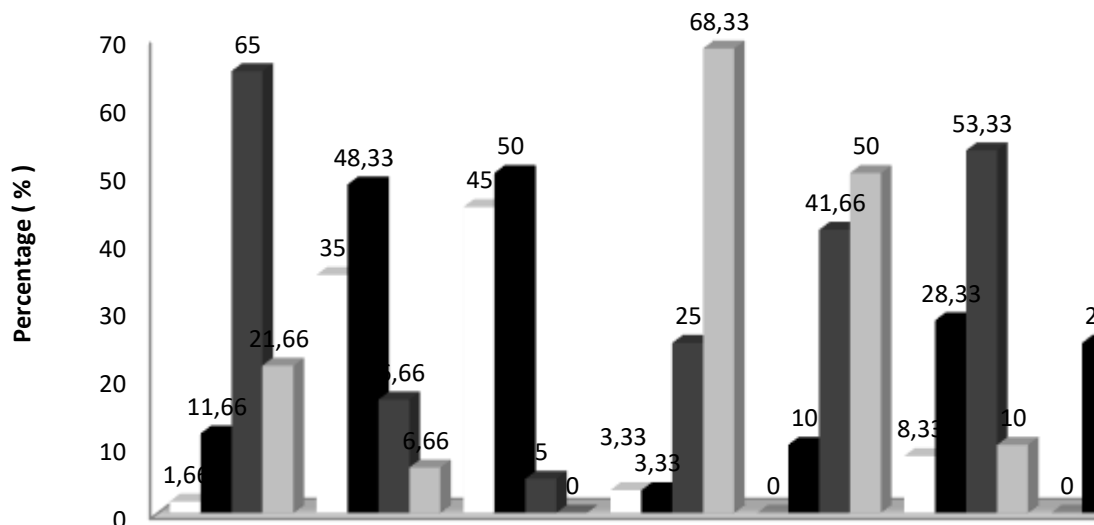


Figure 1. Statement items on indicator of the intensity or frequency of laboratory hands-on activity implementation

Next statement 3 “The teacher implements the laboratory hands-on activity according to the specified schedule”, the respondent who chooses the most answers is the answer to agree with the frequency of 30 students with a percentage of about 50%. The answer that is most answered next is the answer strongly agree, where the answers strongly agree this is the frequency of students who answer around 27 students 45%. The answered by students are the disagree answers with a frequency of around 3 students or around 5%. The answers slightly agree that no respondent answers. In this statement, the percentage of 85% is in the good category. While item statement 4 “The teacher does not give enthusiasm before the lab starts”, the most answered by students is the answer does disagree with the number of students as many as 41 students and the percentage as much as 68.33%. The second most answered is slightly agree where the answers are students answer slightly agree as many as 15 students with a percentage of 25 %. The answer is strongly agree and agree that students answer the same as many as 2 students with a percentage of 3.33%. In this statement, the percentage of 89.58% is in the very good category.

The statement item 5 “Practical activities are never scheduled”, the answer that is most answered by students is the answer does disagree with the frequency of students who answer as many as 30 students or about 50%. The second statement that is mostly answered is the slightly agree answer where the is answered by 15 students or about 25%. The answer much answered by students is the answer agrees with 6 students or about 10%, and for answers strongly agree no student chooses the answer. In this statement, the percentage of 86.25% is in the very good category. But the statement 6 “The teacher always gives laboratory hands-on activity on each learning material”, the answers that were most answered by students were the answers that disagreed with the frequency of the students who answered as many as 32 students or around 53.33%. The second statement that was answered a lot was the agree answer where 17 students answered or around 28.33%. The answers that are answered by students are answers that do disagree with 6 students or around 10%, and for answers strongly agree, only 5 students answered with a percentage of 8.33%. In this statement, the percentage of 61.66% is in the sufficient category.

The statement item 7 “Teachers rarely provide laboratory hands-on activity for each learning material”, the answers that were most answered by students were the answers that slightly agree with the frequency of students who answered as many as 32 students or around 53.33%. The second statement that was answered disagree in which this answer was answered by 15 students or around 25%. Students answered were answers that did disagree with 13 students or around 21.66%, and none of the students chose the answer strongly agree. In this statement, the percentage of 74.16% is in the good category. The statement item 8 “The teacher provides an opportunity for students to ask about the research procedures that have been submitted”, the answer that is most answered by students is the answer strongly agree with the frequency of students who answer as many as 42 students or about 70%. The second statement that is agree answered is

17 students or around 28.33%. Answers which is answered by many students is the answer slightly agree with 1 student or about 1.66%, and no student chooses the answer does disagree. In this statement, the percentage of 92.08% is in the very good category.

There are 16 statement items on indicator of student interest, the percentage of statements can be seen in Figure 2. It can be seen that the indicator of student interest in laboratory hands-on activity is at the percentage level of 82.93% and is included in the good category. To increase the understanding, motivation and interest of students towards laboratory hands-on activity, there needs to be motivation by the teacher, in the opinion of [Hasruddin and Rezeqi, \(2012\)](#) in the learning process, students' attention to the material taught by teachers greatly influences the success or failure of the learning process, this is in line with the results of the study where in this study the teacher has provided enthusiasm and motivation so that the percentage of this indicator is in the good category. In more detail can be seen in each item statement.

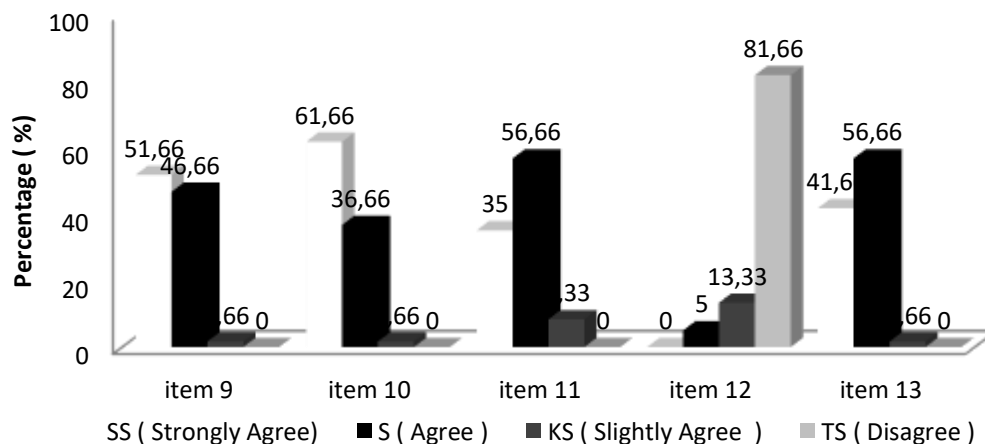


Figure 2. Statement items on indicator of students' interest in laboratory hands-on activity

The statement item 9 "I am always excited about practicing according to a predetermined schedule". The answer that is most answered by students is the answer strongly agrees with the frequency of 31 students or around 51.66%. The second statement that is agree answered is the answer in which this is answered by 28 students or around 46.66%. Answered by students are answers that agree with 1 student or about 1.66%, and no students choose an answer that does slightly agree. In this statement, the percentage of 87.5% is in the very good category. Likewise, on statement item 10 "I am happy at the time of the laboratory hands-on activity, because I can try new things". The answer that is most answered by students is the answer strongly agrees with the frequency of students who answer as many as 37 students or around 61.66%. The second statement that is mostly answered is the answer agree in which this answer is answered by 22 students or around 36.66%. The answers that are answered by students are answers that slightly agree with 1 student or about 1.66%, and no students choose an answer that does disagree. In this statement, getting a percentage of 90% is in a very good category. The statement item 11 "I want the laboratory hands-on activity clock added", the answer that is most answered by students is the answer agrees with the frequency of students who answer as many as 34 students or around 56.66%. The second statement that is mostly answered is that the answers strongly agree where the answer is answered by 21 students or around 35%. Answers which is answered by many students is the answer is slightly agree with 5 students or around 8.33%, and no students choose the answer disagree. In this statement, the percentage of 95.8% is in the very good category.

The statement item 12 "I don't like it when I do laboratory hands-on activity", the answer that is most answered by students is the answer does disagree with the frequency of students who answered as many as 49 students or around 81.66%. The second statement that is mostly answered is the slightly agree answer where the answer is answered by 8 students or about 13.33%. The answered by students are the answers agree with 3 students or around 5%, and no students who choose answers strongly agree. In this statement, the percentage of 94.16% is in the very good category. As well as the statement item 13 "I get material study through practical activities", the answer that is most answered by students is the answer agree with the frequency of students who answer as many as 34 students or around 56.66%. The second statement that is

mostly answered is that the answers strongly agree where the answer is answered by 25 students or around 41.66%. Answers that are answered by students are answers that do slightly agree with 1 student or about 1.66%, and no students choose an answer that does disagree. In this statement, the percentage of 85% is in the very good category too.

Based on Figure 3, the statement item 14 “The practice of biology makes me always excited”, the answer that is most answered by students is the answer agrees with the frequency of students who answer as many as 32 students or around 53.33%. The second statement that is mostly answered is that the answers strongly agree where the answer is answered by 27 students or around 45%. The answers which is answered by many students is the answer is slightly agree with 1 student or about 1.66%, and no student chooses the answer does disagree. In this statement, the percentage of 85.83% is in the very good category. Likewise, on the item statement 15 “I like to enter the lab late”, the answer that is most answered by students is the answer does disagree with the frequency of students who answer as many as 38 students or around 63.33%. The second statement that is mostly answered is the slightly agree answer where the answer is answered by 22 students or around 36.66%. The answer strongly agreed and agreed that no students would answer. In this statement, the percentage of 90.83% is in the very good category. As well as the statement item 16 “I feel bored with biology laboratory hands-on activity activities”, the answer that is most answered by students is the answer does disagree with the frequency of students who answer as many as 39 students or about 65%. The second statement that is mostly answered is the slightly agree answer where the answer is answered by 19 students or around 31.66%. The answers that are answered a lot by students are answers agree with 2 students or around 3.33%, and no students who choose answers strongly agree. In this statement, the percentage of 90.41% is in the very good category too.

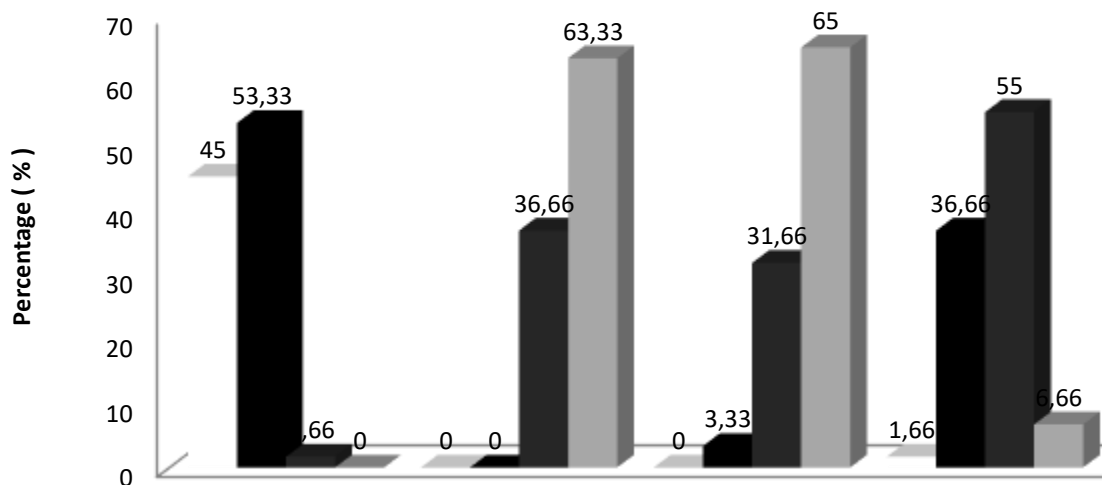


Figure 3. Statement items on Indicator of student interest in laboratory hands-on activity

But on the item statement 17 “I study at home about the material that will be practiced”, the answers that were most answered by students were the answers that slightly agree with the frequency of students who answered as many as 33 students or around 55%. The second statement that was answered a lot was the agreed answer where the answer was answered by 22 students or around 36.66%. The answer which is answered by many students is the answer does disagree with 4 students or about 6.66%, and 1 student who chooses the answer does disagree with the percentage of 1.66%. In this statement, the percentage of 58.33% is in the sufficient category. Different from the statement item 18 “I like learning biology in the classroom rather than through practical activities”, the answers that were most answered by students were answers that slightly agree with the frequency of students who answered as many as 37 students or around 61.66%. The second statement that was answered a lot was an agreed answer and did disagree where this answer was answered by 10 students or around 16, 66%. The answers by students are answers that strongly agree with 3 students or around 5%. In this statement, the percentage of 72.5% is in the good category.

Based on Figure 4, on the statement item 19 "I feel happy that every laboratory hands-on activity is carried out", the answer that is most answered by students is the answer strongly agree where in this answer the students who answered numbered 31 students with a percentage of 51.66%. The followed by an agreed answer where in this answer students answered about 29 students or around 48.33%, and then no students answer the disagree and the answers slightly agree. In this statement, the percentage of 87.91% is in the very good category. The statement item 20 "I always bring tools and materials that the teacher instructs during the lab", the answer that is most answered by students is the answer agrees with the frequency of students who answer as many as 32 students or around 53.33%. The second statement that is mostly answered is the answer strongly agree is answered by 27 students or around 45%. The answer answered by students is the answer is slightly agree with 1 student or about 1.66%, and no students who answer disagree. In this statement, the percentage of 85.8% is in the very good category.

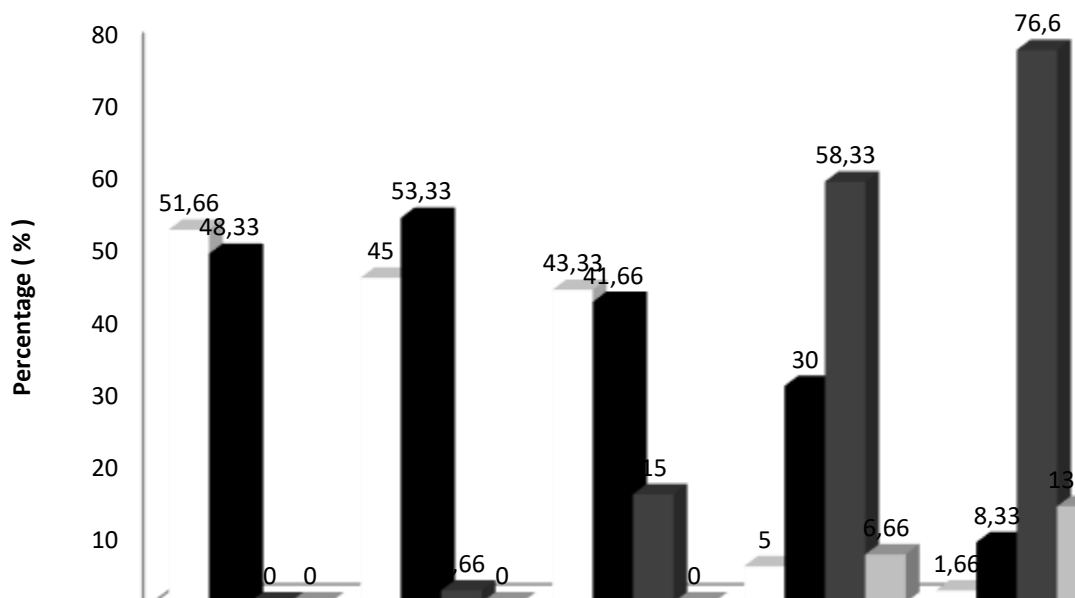


Figure 4. Statement items on Indicator of student interest in laboratory hands-on activity

But the statement item 21 "I read the guidelines or practical work steps before laboratory hands-on activity activities are carried out", the most answered answer is a strongly agree answer, which is around 26 students or around 43.33% students answer strongly agree. The statement that is answered a lot by students is agree that is as many as 25 students or about 41.66% students answer agree, then 9 students or about 15% of students answered slightly agree, and not students answered disagree. The percentage of answers from this statement is about 82.08% in the good category. Different from statement item 22 "I better understand the material taught in class than the material taught at the laboratory hands-on activity", the most answered answer is the slightly agree answer, which is around 35 students or around 58.33% of students answer disagree. The statement that is answered by students is a statement of agree that is as many as 18 students or about 30% students agree. 4 students around 6.66% of students answered disagree, and 3 students who answered strongly agreed to the percentage of 5%. The percentage of answers from this statement is around 66.6% in the sufficient category.

The item statement 23 "I cannot understand the biological concepts that are practiced in practical activities", the most answered answer is the slightly agree answer, which is around 46 students or about 76.6% of students answer slightly agree. The statement that is answered a lot by students is a disagree statement that is as many as 8 students or about 13.33% students answer disagree, then 5 students or about 8.33% of students agreed, and 1 student who answered strongly agreed to the percentage of 1.66%. The percentage of answers from this statement is around 75.41% which are in the good category. As well as the statement item 24 "Practical activities can make me solve various problems in the concept of biological concepts", the most answered answer is the agreed answer, which is about 40 students or around 66.66% of students answer in agree. The statement that is answered by students is a strongly agree statement that is as many as 15 students or around 25% students answer strongly agree. 4 students around 6.66% of students

answered slightly agree, and 1 student who answered strongly agreed to the percentage of 1.66. The percentage of answers from this statement is about 78.75% which are in the good category too.

Based on Figure 5, there are 8 statement items for the laboratory hands-on activity time indicator, it can be seen that the indicator of laboratory hands-on activity time is at a percentage level of 79.58% and is included in the good category. Some students stated that they had carried out the laboratory hands-on activity on time according to what was instructed by the teacher. However, there is still no scheduling of practical activities, this is in line with the research of Hasruddin and Rezeqi, (2012) which states that the implementation of laboratory hands-on activity in Public High Schools in Karo district is still low because there is no scheduling of practical activities. In more detail can be seen in each item questions.

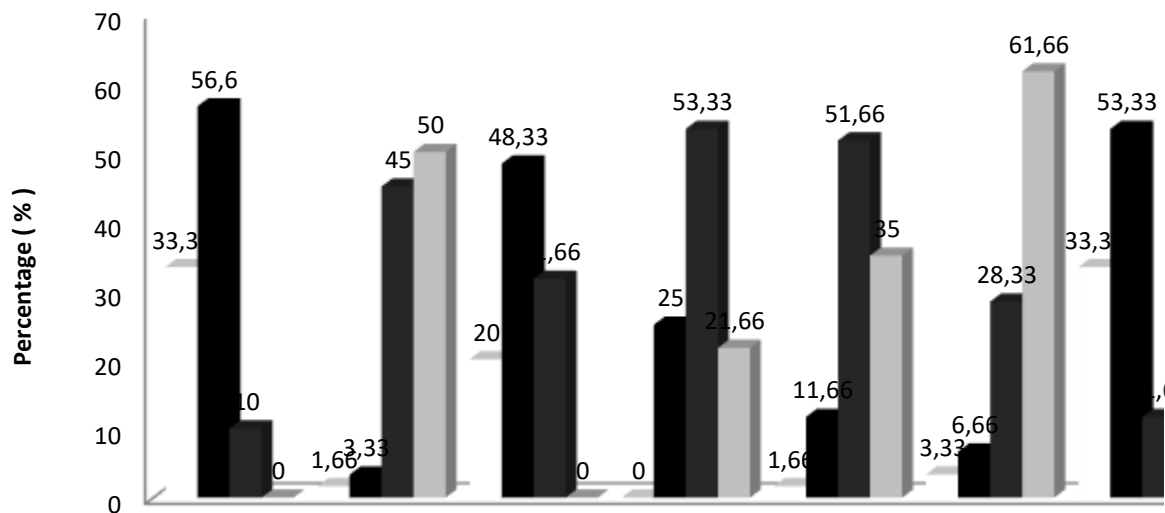


Figure 5. Statement items on indicator of Implementation time for laboratory hands-on activity

The statement item 25 “Laboratory hands-on activity is carried out on time”, the most answered answer is the agreed answer, which is around 34 students or around 56.66% of students answer in agree. The statement that is answered by students is a strongly agree statement that is as many as 20 students or around 33.33%, students answer strongly agree. 6 students or about 10% of students answered slightly agree, and no students answered did disagree. The percentage of answers from this statement is around 80.83% which are in the good category. As well as the statement item 26 “Laboratory hands-on activity is carried out inappropriately”, the most answered answer is the disagree answer, which is about 30 students or about 50% of students answer disagree. The statement that is answered by students is a statement of slightly agree that is as many as 27 students or about 45% of students answer slightly agree. 2 students or around 3.33% of students answered agreed, and 1 student who answered strongly agreed to the percentage of 1.66%. The percentage of answers from this statement is about 85.83% which are in the very good category. Likewise, the statement item 27 “In one practice the available time is sufficient”, the most answered answer is the agreed answer, which is about 29 students or around 48.33% of students answer in agree. The statement that is answered by students is a statement of slightly agree that is as many as 19 students or around 31.66% of students answer slightly agree. 12 students or about 20% of students answered strongly agree, and no students answered did disagree. The percentage of answers from this statement is around 72.08% which are in the good category.

The statement item 28 “In one practice the available time is insufficient”, the most answered answer is the slightly agree answer, which is around 32 students or around 53.33% students answer slightly agree. The statement that is answered a lot by students is an agreed statement that is as many as 15 students or about 25% students agree. 13 students or around 21.66% of students answered disagree, and no students who answered strongly agreed. The percentage of answers from this statement is around 74.16% which are in the good category. The statement item 29 “The teacher’s explanation at the time of the practice is difficult to understand”, the most answered answer is the slightly agree answer which is around 31 students or around 51.66% of students answer disagree. The statement that is answered a lot by students is a disagree statement that is as many as 21 students or about 35% students answer disagree. 7 students or around

11.66% of students answered agreed, and 1 student who answered strongly agreed to the percentage of 1.66%. The percentage of answers from this statement is about 80% in the good category.

The statement item 30 “The teacher leaves the laboratory hands-on activity when the laboratory hands-on activity is held”, the most answered answer is the disagree answer, which is around 37 students or around 61.66% of the students answer disagree. The statement that is answered by students is a statement of slightly agree that is as many as 17 students or about 28.33% of students answer slightly agree. 4 students or around 6.66% of students answered in agree, and 2 students who answered strongly agreed with the percentage of 3.33%. The percentage of answers from this statement is about 87.08% in the very good category. As well as the statement item 31. “Laboratory hands-on activity is carried out regularly according to a predetermined schedule”, the most answered answer is the agreed answer, which is about 32 students or around 53.33% of students answer in agree. The statement that is answered by students is a strongly agree statement that is as many as 20 students or around 33.33% students answer strongly agree. 7 students or around 11.66% of students answered slightly agree, and 1 student who answered strongly agreed to the percentage of 1.66%. The percentage of answers from this statement is around 79.58% which are in the good category. And the statement item 32 “Laboratory hands-on activity is not only done indoors but also utilizes the surrounding environment”, the most answered answer is the agreed answer, which is about 24 students or about 40% of students answer in agree. The statement that is answered a lot by students is a strongly agree statement that is as many as 22 students or around 36.66% students answer strongly agree. 11 students or around 18.33% of students answered slightly agree, and 3 students who answered disagreed to the percentage of 5%. The percentage of answers from this statement is around 77.08% which are in the good category too.

Based on Figure 6, there are 20 statement items, it can be seen that the indicator of preparation and laboratory hands-on activity implementation is at a percentage level of 80.66% and is included in the good category. Students have become accustomed to preparing tools and materials before laboratory hands-on activity activities, this is in line with the research of [Mariyam, Lestari, and Afniyanti, \(2015\)](#) stating that students are clever in preparing lab tools and materials so that overall management level or implementation of biology laboratory hands-on activity runs well.

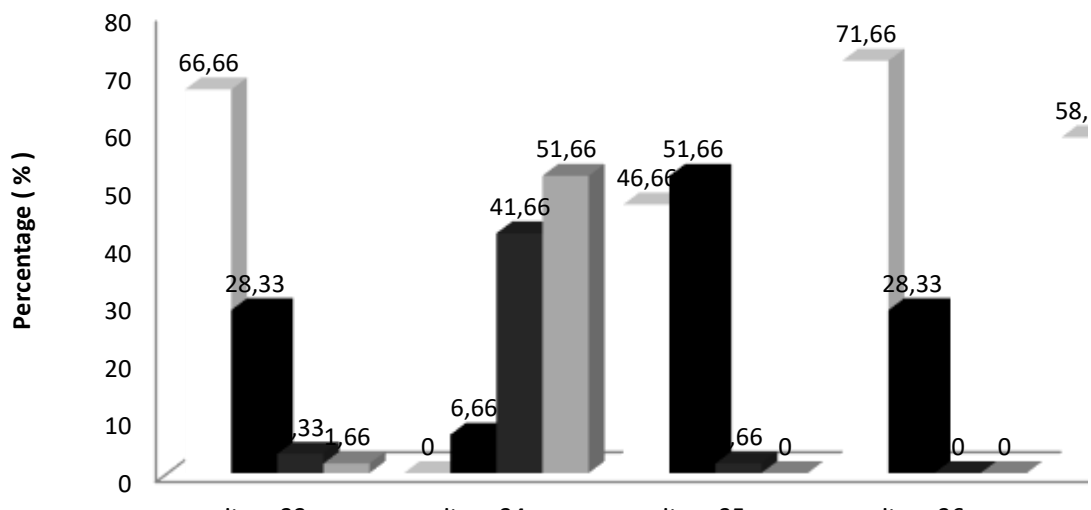


Figure 6. Statement items on indicators of preparation laboratory hands-on activity

On the statement item 33 “Before the laboratory hands-on activity the teacher divided the students into several groups”, the most answered answer is a strongly agree answer which is around 40 students or around 66.66% of students answer strongly agree. The statement that is answered a lot by students is a statement of agree that is as many as 17 students or around 28.33% students agree. 2 students or around 3.33% of students answered slightly agree, and 1 student who answered did disagree with the percentage of 1.66%. The percentage of answers from this statement is 90% which are in a very good category. But on the statement item 34, “The laboratory hands-on activity implemented is not in accordance with the laboratory hands-on activity worksheet”, the most answered answer is the disagree answer, which is around 31 students or about 51.66% of students answer disagree. The statement that is answered by students is a statement of

slightly agree that is as many as 25 students or around 41.66% of students answer slightly agree. 4 students or equal to 6.66% of students answered in agree, and no students who answered strongly agreed. The percentage of answers from this statement is about 86.25% in the excellent category.

While on the statement item 35 “Every laboratory hands-on activity result is in accordance with laboratory hands-on activity procedures”, the most answered answer is the agreed answer, which is around 31 students or around 51.66% of students answer in agree. The statement that is answered a lot by students is a strongly agree statement that is as many as 28 students or around 46.66% students answer strongly agree. 1 student or around 1.66% of students answered slightly agree, and no students answered did not agree. The percentage of answers from this statement is 86.25% which are in the very good category. As well as on the statement item 36 “Before the biology lab the teacher gives a prior explanation of the activities to be carried out”, the most answered answer is strongly agreed answer, which is around 43 students or around 71.66% of students answer strongly agree. The statement that is answered a lot by students is a statement of agree that is as many as 17 students or about 28.33% students agree. There were no students who chose answers that slightly agree and disagree. The percentage of answers from this statement is 92.91% which are in the very good category. And the statement item 37 “Biology teachers convey the objectives of each biology laboratory hands-on activity to be carried out”, the most answered answer is a strongly agreeable answer which is around 35 students or around 58.33% students answer strongly agree. The statement that is answered a lot by students is a statement of agree that is as many as 24 students or about 40% of students agree. 1 student or around 1.66% of students answered slightly agree, and no students answered disagree. The percentage of answers from this statement is 89.16% which are in the very good category too.

Based on Figure 7, on statement item 38 “Through biology laboratory hands-on activity in the laboratory I did I got a deepening of biological material”, the most answered answer is the agreed answer, which is around 37 students or around 61.66% of students answer in agree. The statement that is answered a lot by students is a strongly agree statement that is as many as 22 students or around 36.66% students answer strongly agree. 1 student or around 1.66% of students answered disagree, and no students answered slightly agree. The percentage of answers from this statement is 83.33% which are in the very good category. But on the statement item 39 “Every implementation of my biology lab uses lab suits, masks, gloves, which are used to keep away from accidents during laboratory hands-on activity”, the most answered answer is the slightly agree answer, which is around 20 students or around 33.33% of the students answer slightly agree. The statement that is answered by students is a statement of agree that is as many as 19 students or around 31.66% of students agree. 15 students or about 25% of students answered disagree, and 6 students who answered strongly agreed with a percentage of 10%. The percentage of answers from this statement amounted to 56.66% which were in the sufficient category.

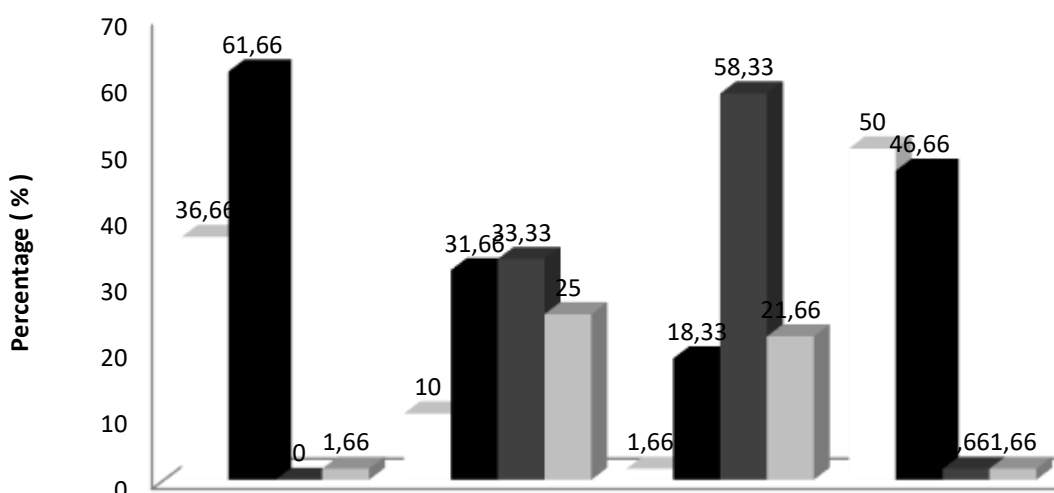


Figure 7. Statement items on indicator of preparation laboratory hands-on activity

While on statement item 40 “The teacher gives a quiz before laboratory hands-on activity”, the most answered answer is the slightly agree answer, which is about 35 students or around 58.33% of students answer slightly agree. The statement that is answered by students is a statement that disagrees as many as

13 students or about 21.66% of students answer disagree. 11 students or about 18.33% of students answered agreed, and 1 student who answered strongly agreed with the percentage of 1.66%. The percentage of answers from this statement amounted to 21.66% in the less category. But on the statement item 41 “In conducting biological laboratory hands-on activity observations each group member gets the same opportunity to observe the results of the lab”, the most answered answer is a strongly agree answer which is around 30 students or about 50% of students answer strongly agree. The statement that is answered a lot by students is an agreed statement that is as many as 28 students or around 46.66% of students agree. 1 student answer slightly agree and disagree with the percentage of 1.66%. The percentage of answers from this statement is 86.25% which are in the very good category. And the statement item 42 “At the time of laboratory hands-on activity, the teacher explains well what must be done”, the most answered answer is a strongly agreeable answer, which is around 37 students or around 61.66% of students answer strongly agree. The statement that is answered a lot by students is an agreed statement that is as many as 23 students or around 38.33% students agree, then not there are students who answer answers that slightly agree and disagree. The percentage of answers from this statement is 90.41% which are in the very good category.

Based on Figure 8, on statement item 43 “The teacher does not give quizzes or questions before the lab is carried out”, the most answered answer is the slightly agree answer, which is around 30 students or around 50% of students answer slightly agree. The statement that is answered a lot by students is an agreed statement that is as many as 19 students or around 31.66% students agree. 7 students who answered disagree with the percentage of 11.66%, and 4 students with a percentage of 6.66% answered strongly agree. The percentage of answers to this statement is 66.66% which are in the very good category. As well as the statement item 44 “Before laboratory hands-on activity, laboratory hands-on activity tools and materials have been provided”, the most answered answer is a strongly agreeable answer, which is about 36 students or around 60% of students answer strongly agree. The statement that is answered a lot by students is an agreed statement that is as many as 23 students or around 38.33% students agree. 1 student answer slightly agree with the percentage of 1.66%, and no students who answer disagree. The percentage of answers to this statement is 66.66% which are in the very good category.

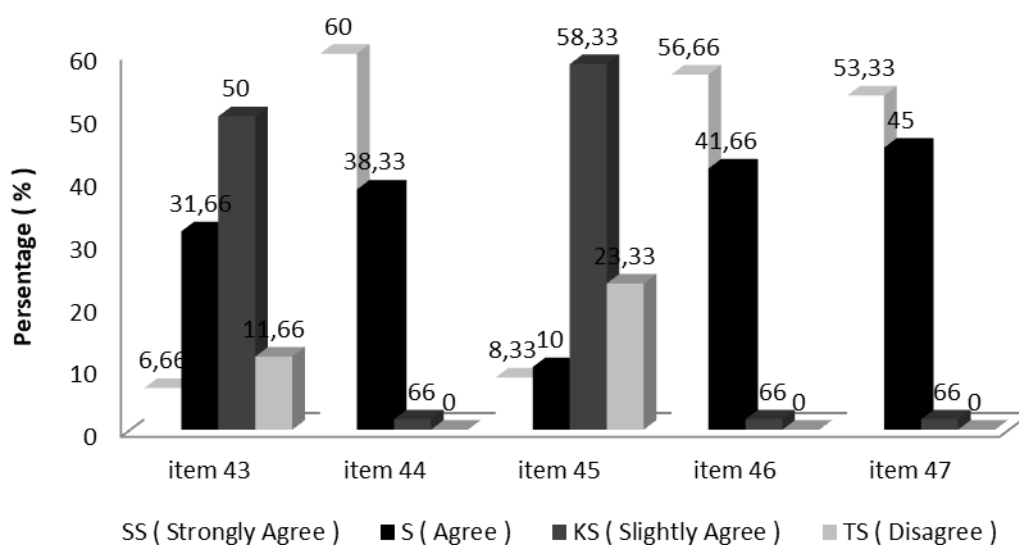


Figure 8. Statement items on indicators of preparation laboratory hands-on activity

On the statement item 45 “Practical activities have not gone well”, the most answered answer is the slightly agree answer, which is about 35 students or around 58.33% of students answer slightly agree. The statement that is answered a lot by students is a disagreement statement that is as many as 14 students or about 23.33% students answer disagree. 6 students who answered agreed with a percentage of 10%, and 5 students with a percentage of 8.33% answered strongly agree. The percentage of answers from this statement is 74.16% which are in the good category. But on the statement item 46 “The teacher is able to foster a sense of joy and curiosity at the time of practicing”, the most answered answer is a strongly agree answer, which is around 34 students or around 56.66% of students answer strongly agree. The statement that is answered a lot by students is a statement of agree that is as many as 25 students or about 41.66%

students who answered slightly agree with a percentage of 1.66%, and no students who answered is disagree. The percentage of answers from this statement is 88.75% which are in the very good category. So does the statement item 47 "The material in the laboratory hands-on activity is in accordance with the material taught in the class", the most answered is a strongly agree answer, which is around 32 students or around 53.33% of students answer strongly agree. The statement that is answered a lot by students is an agree statement that is as many as 27 students or about 45% of students agree. 1 student answer disagree with a percentage of 1.66%, and no students who answer slightly agree. The percentage of answers from this statement is 87.91% which are in a very good category.

Based on Figure 9 on statement item 48 "There is no practical guide book yet", the most answered answer is the slightly agree answer that is equal to 24 students or about 40% of students answer slightly agree. The statement that is answered a lot by students is a statement of agree and disagree that is as many as 16 students or about 26.66%. 4 students who answered strongly agree with the percentage of 6.66%. The percentage of answers from this statement is 71.66% which are in the good category. Statement item 49 "I have difficulty using practical tools", the most answered answer is the slightly agree answer, which is around 31 students or around 51.66% of the students answer in slightly agree. The statement that is answered by students is an agreed statement that is 15 students or about 25% students agree. 13 students who answer disagree with the percentage of 21.66%, and 1 student who answers strongly agrees with the percentage of 1.66%. The percentage of answers from this statement is 73.33% which are in the good category.

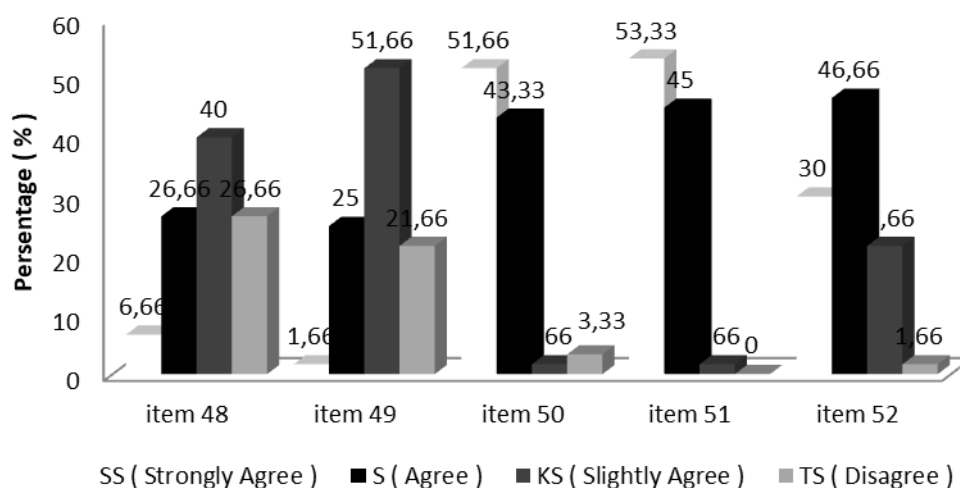


Figure 9. Statement items on indicators of preparation laboratory hands-on activity

On statement item 50, "When the laboratory hands-on activity is finished the teacher instructs to work on the laboratory hands-on activity student worksheet LKS / LKPD that has been given by the teacher", the most answered answer is a strongly agreeable answer which is around 31 students or around 51.66% of students answer strongly agree. The statement that is answered a lot by students is an agreed statement that is as many as 26 students or around 43.33% students agree. 2 students who answer disagree with a percentage of 3.33%, and 1 student who answers slightly agree with a percentage of 1.66%. The percentage of answers from this statement is 85.83% which are in the very good category. While on the statement 51 "The teacher always concludes the results of the lab", the most answered answer is a strongly agreeable answer, which is around 32 students or around 53.33% of students answer strongly agree. The statement that is answered a lot by students is an agreed statement that is as many as 27 students or about 45% of students agree. 1 student answer slightly agree with the percentage of 1.66%, and no students who answer do not agree. The percentage of answers from this statement is 87.91% which are in a very good category.

The statement item 52, "Practical guidebooks are well packed, and interesting so that their contents are easy to understand", the most answered answer is the answer, which is about 28 students or around 46.66% of the students answered in agree. The statement that is answered by students is a strongly agree statement that is as many as 18 students or around 30% students answer strongly agree. 13 students who answer slightly agree with the percentage of 21.66%, and 1 student who answers disagree with the percentage of 1.66%. The percentage of answers from this statement is 76.25% which are in the good category. In addition to using questionnaires, the author also interviewed students and teachers to support data collection that

cannot be explained using a questionnaire, data obtained through interviews, such as: laboratory hands-on activity is done every time there is laboratory hands-on activity material or about 4 times in one semester, things that hinder during the laboratory hands-on activity process are that there is no time available, rarely practice natural utilization activities, there is no additional time when the study time has been completed, and the teacher rarely tests before or after the laboratory hands-on activity. Practical guidebooks are available well. And the atmosphere of the lab is very conducive.

The results of this research are also similar to the research conducted by Lauriala, (2006) in a previous study stated that the application of biology laboratory hands-on activity in Public High Schools in Jambi City was in good category, students had prepared their own tools and materials before the lab began. So that when laboratory hands-on activity students are ready with the material to be delivered by the teacher, reports and evaluations are also very good. Previous research conducted by Hamidah et al., (2014) showed that biology laboratory hands-on activity activities in secondary school laboratories in Jambi City were well implemented but there were still several obstacles faced by teachers and students during the lab implementation process. Various obstacles and difficulties experienced by teachers and students include the existence of the biology laboratory itself because 40% of the biology laboratory space in public secondary schools in Jambi City is not used as a practice place but is used as a classroom for learning.

CONCLUSION

Based on the results of the study, the application of biology laboratory hands-on activity in class XI MIPA SSSHS 10 Pekanbaru has been carried out well can be seen from each indicator, i.e. indicators of laboratory hands-on activity intensity have a percentage of 76.14% in good category. Indicators of student interest in laboratory hands-on activity obtained a percentage of 82, 93% are in the good category. The laboratory hands-on activity time indicator has a percentage of 79.58% and is in a good category. The last indicator, which is laboratory hands-on activity, has a percentage of 80.66% and is in the good category. Based on questionnaire data and the results of interviews with teachers in the field of biological studies, the laboratory hands-on activity is carried out about 4 times, and sometimes there are some material that is not practiced. There are several things that hinder during the practical process, for example, the available time is insufficient, rarely practice natural utilization activities, there is no additional time when the study time has been completed, and the teacher rarely tests before or after the laboratory hands-on activity.

REFERENCES

- Afifah, K., & Astuti, A. P. (2017). Pengaruh kondisi laboratorium terhadap keterampilan proses sains siswa SMA Negeri 11 Semarang. *Seminar Nasional Pendidikan, Sains Dan Teknologi Fakultas Matematika Dan Ilmu Pengetahuan Alam Universitas Muhammadiyah Semarang*, 195–199. Retrieved from <https://jurnal.unimus.ac.id/index.php/psn12012010/article/view/3059>
- Agustina, P. (2015). Persepsi mahasiswa calon guru biologi tentang pengembangan praktikum biologi sekolah menengah: studi pengembangan pembelajaran pada mahasiswa pendidikan biologi FKIP Universitas Muhammadiyah Surakarta. *Jurnal Bioedukatika*, 3(2), 26–29. doi: <https://doi.org/10.26555/bioedukatika.v3i2.4151>
- Atnur, W. N., Lufri, L., & Sumarmin, R. (2015). Analisis pelaksanaan praktikum ipa biologi kelas viii semester 1 di SMP Negeri sekecamatan Lubuk Begalung tahun pelajaran 2014/2015. *Kolaboratif*, 2(2), 1–21. Retrieved from <http://ejournal.unp.ac.id/index.php/kolaboratif/article/view/5037>
- Davies, M., & Heyward, P. (2019). Between a hard place and a hard place: A study of ethical dilemmas experienced by student teachers while on practicum. *British Educational Research Journal*, 45(2), 372–387. doi: <https://doi.org/10.1002/berj.3505>
- Dewi, I. S., Sunariyati, S., & Neneng, L. (2014). Analisis kendala pelaksanaan praktikum biologi di SMA Negeri se-kota Palangka Raya. *EduSains Jurnal Pendidikan Sains Dan Matematika*, 2(1), 5–8. Retrieved from <http://e-journal.iain-palangkaraya.ac.id/index.php/edusains/article/view/16>
- Grudnoff, L., Haigh, M., & Mackisack, V. (2017). Re-envisioning and reinvigorating school–university practicum partnerships. *Asia-Pacific Journal of Teacher Education*, 45(2), 180–193. doi: <https://doi.org/10.1080/1359866X.2016.1201043>
- Gürsoy, E. (2013). Improving practicum for a better teacher training. *Procedia - Social and Behavioral Sciences*, 93, 420–425. doi: <https://doi.org/10.1016/j.sbspro.2013.09.214>
- Hamidah, A., Sari, E. N., & Budianingsih, R. S. (2014). Persepsi siswa tentang kegiatan praktikum biologi di

- laboratorium SMA Negeri sekota Jambi. *Jurnal Sainmatika*, 8(1), 49–59. Retrieved from <https://media.neliti.com/media/publications/221111-persepsi-siswa-tentang-kegiatan-praktiku.pdf>
- Hansmann, R. (2009). Linking the components of a university program to the qualification profile of graduates: The case of a sustainability-oriented environmental science curriculum. *Journal of Research in Science Teaching*, 46(5), 537–569. doi: <https://doi.org/10.1002/tea.20286>
- Hasruddin, & Rezeqi, S. (2012). Analisis pelaksanaan praktikum biologi dan permasalahannya di SMA Negeri sekabupaten Karo. *Jurnal Tabularasa PPS*, 9(1), 17–32. Retrieved from <http://digilib.unimed.ac.id/1402/>
- Hayati, D. P., Bintari, S. H., & Sukaesih, S. (2018). Implementation of the practicum methods with guided-discovery model to the student skill of science process. *Journal of Biology Education*, 7(1), 118–126. Retrieved from <https://journal.unnes.ac.id/sju/index.php/ujbe/article/view/23005>
- Husna, D. N., Ngabekti, S., & Abdullah, M. (2018). The development of pteridophyte catalog of curug lawe petungkriyono as learning source for senior high school students. *Journal of Biology Education*, 7(1), 82–90. Retrieved from <https://journal.unnes.ac.id/sju/index.php/ujbe/article/view/22677>
- Indriastuti, I., Herlina, L., & Widiyaningrum, P. (2013). Kesiapan laboratorium biologi dalam menunjang kegiatan praktikum SMA Negeri di kabupaten Brebes. *Journal of Biology Education*, 2(2), 109–115. Retrieved from <https://journal.unnes.ac.id/sju/index.php/ujbe/article/view/2834>
- Kahar, M. S. (2018). Motivation analysis learning in the implementation of physics practicum. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 8(1), 1–6. doi: <https://doi.org/10.30998/formatif.v8i1.2304>
- Khamidah, N., & Aprilia, N. (2014). Evaluasi program pelaksanaan praktikum biologi kelas XI SMA sekecamatan Umbulharjo Yogyakarta semester 2 tahun ajaran 2013/2014. *Jupemasi-Pbio*, 1(1), 5–8. Retrieved from <http://jupemasipbio.uad.ac.id/?p=6>
- Kilinc, A., Demiral, U., & Kartal, T. (2017). Resistance to dialogic discourse in SSI teaching: The effects of an argumentation-based workshop, teaching practicum, and induction on a preservice science teacher. *Journal of Research in Science Teaching*, 54(6), 764–789. doi: <https://doi.org/10.1002/tea.21385>
- Kokkinos, C. M., Stavropoulos, G., & Davazoglou, A. (2016). Development of an instrument measuring student teachers' perceived stressors about the practicum. *Journal Teacher Development*, 20(2), 275–293. doi: <https://doi.org/10.1080/13664530.2015.1124139>
- Lauriala, A. (2006). The role of practicum contexts in enhancing change in student teachers' professional beliefs. *European Journal of Teacher Education*, 20(3), 267–282. doi: <https://doi.org/10.1080/0261976970200306>
- Lawson, T., Cakmak, M., Gunduz, M., & Busher, H. (2015). Research on teaching practicum – a systematic review. *European Journal of Teacher Education*, 38(3), 392–407. doi: <https://doi.org/10.1080/02619768.2014.994060>
- Lee, O., Liosa, L., Haas, A., Connor, C., & Booven, C. D. V. (2016). Elementary teachers' science knowledge and instructional practices: Impact of an intervention focused on english language learners. *Journal of Research in Science Teaching*, 53(4), 579–597. doi: <https://doi.org/10.1002/tea.21314>
- Mariyam, S., Lestari, R., & Afniyanti, E. (2015). Analisis pelaksanaan praktikum pada pembelajaran biologi siswa kelas viii di SMP Negeri 3 Kuntodarussalam tahun pembelajaran 2014/2015. *Jurnal Mahasiswa FKIP Universitas Pasir Pengaraian*, 1(1), 1–4. Retrieved from <http://e-journal.upp.ac.id/index.php/fkipbiologi/article/view/320>
- Martins, M., Costa, J., & Onofre, M. (2015). Practicum experiences as sources of pre-service teachers' self-efficacy. *European Journal of Teacher Education*, 38(2), 263–279. doi: <https://doi.org/10.1080/02619768.2014.968705>
- Mena, J., Garcia, M., Clarke, A., & Barkatsas, A. (2016). An analysis of three different approaches to student teacher mentoring and their impact on knowledge generation in practicum settings. *European Journal of Teacher Education*, 39(1), 53–76. doi: <https://doi.org/10.1080/02619768.2015.1011269>
- Muliadong, Afifah, N., & Karno, R. (2016). Analisis pelaksanaan praktikum biologi SMA Negeri 1 dan SMA Negeri 2 kecamatan Tambusai. *Jurnal Mahasiswa FKIP Universitas Pasir Pengaraian*, 2(1), 1–6. Retrieved from <http://e-journal.upp.ac.id/index.php/fkipbiologi/article/view/610>
- Rahmi, L., & Sasmita, K. (2018). Profil laboratorium biologi SMA swasta sekecamatan Sail kota Pekanbaru tahun ajaran 2017/2018. *Indonesian Biology Teachers (Jurnal Pembelajaran Biologi)*, 1(2), 76–79. Retrieved from <https://ejournal.unri.ac.id/index.php/IBT/article/view/6207>
- Ratmini, W. S. (2017). Implementation of chemistry practicum at SMA Laboratorium Undiksha Singaraja year 2016/2017. *Jurnal Pendidikan Indonesia*, 6(2), 242–254. Retrieved from <https://ejournal.undiksha.ac.id/index.php/JPI/article/view/11881/8571>

- Sadjati, I. M., & Pertiwi, P. R. (2013). Persepsi mahasiswa tentang penyelenggaraan praktikum pada pendidikan tinggi terbuka jarak jauh. *Jurnal Pendidikan Terbuka Dan Jarak Jauh*, 14(1), 45–56. Retrieved from <http://jurnal.ut.ac.id/index.php/JPTJJ/article/view/128/103>
- Siburian, F., Sinambela, M., & Septie, S. (2017). Analisis pelaksanaan praktikum pada mata pelajaran biologi di kelas x SMA Negeri 16 Medan. *Jurnal Pelita Pendidikan*, 5(2), 21–31. Retrieved from <https://jurnal.unimed.ac.id/2012/index.php/pelita/article/view/7546>
- Supliyadi, S., Baedhoni, M. I., & Wiyanto, W. (2017). Penerapan model guided discovery learning berorientasi pendidikan karakter untuk meningkatkan hasil belajar siswa kelas xi SMA Negeri 1 Semarang tahun pelajaran 2017/2018. *Jurnal Profesi Keguruan*, 3(2), 205–212. Retrieved from <https://journal.unnes.ac.id/nju/index.php/jpk/article/view/12276/7101>
- Tillema, H. H., Smith, K., & Leshem, S. (2011). Dual roles – conflicting purposes: a comparative study on perceptions on assessment in mentoring relations during practicum. *European Journal of Teacher Education*, 34(2), 139–159. doi: <https://doi.org/10.1080/02619768.2010.543672>