

FREQUENCY ANALYSIS AND EVALUATION OF THE IMPLEMENTATION OF CLASS X BIOLOGY PRACTICES IN SENIOR HIGH SCHOOL

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ABSTRACT

This study aims to determine students' frequency, evaluation, and perceptions on the implementation of practicum in SMA Negeri in Rantau Prapat City. The sample in this study were 3 teachers and students of class X MIA at SMA Negeri 1 Rantau Utara, SMA Negeri 2 Rantau Utara and SMA Negeri 1 Rantau Selatan totaling 107 people taken by random sampling. The data analysis technique used is a quantitative descriptive analysis technique, which describes and explains the data based on the field. This research is an explorative survey, namely by observing, interviewing, and exploring. The analysis results show that the average frequency of practicum implementation is 66%, which is quite often done. The laboratory conditions in the three sample schools were classified as very good (83.18%). The student interest in laboratory activities is also classified as very good (86.14%), but some schools, namely SMA Negeri 1 Rantau Utara and SMA Negeri 2 Rantau Utara, experienced problems in the time of practicum implementation (70.44%). The preparation and implementation of the practicum have been carried out very well (88.07%), with 83.90% of reports and evaluations carried out for each practicum activity. However, although it is classified as very good, the average evaluation value is only 59.60, which is quite enough.

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INTRODUCTION

Education is essentially an effort to cultivate humans or humanize humans. Education is very strategic for the intellectual life of the nation to improve the quality of the nation ([Saondi and Suherman, 2012](#)). This illustrates that the function of education can improve the welfare of an educated person. Thus, education is to guide students towards a goal that we value highly, and good education is a successful effort to bring all students to that goal. (2010).

The biology learning process is one example of an intense and motivating learning process for students. [Mastika et al. \(2014\)](#) stated that practice would be more effective in improving students' skills in observing and improving skills and practicing using the equipment. In addition, practicum activities can help students achieve the desired learning outcomes and their application in daily life according to the deepening of the material they have obtained. Practicum is one of several factors that influence student learning outcomes which play an essential role in supporting the teaching and learning process ([Sobiroh, 2006](#)).

Practical activities are part of learning that aims to test and implement a theory in real situations. Practicum is a form of learning activity that aims to strengthen students' knowledge of subject matter through an application, analysis, synthesis, and evaluation of theory in the laboratory and the field. Practicum can increase students' motivation to learn biology. Motivation affects students who are motivated to learn more deeply ([Dewi et al., 2013](#)).

The implementation of the practicum is followed by an assessment carried out by the teacher. Assessment is a systematic process and includes activities to collect, analyze, and interpret information to determine how far a student or group of students achieves the learning objectives that have been set, both aspects of knowledge, attitudes, and skills (Gronlund and Linn in [Kusaesari and Suprananto, 2012](#)). Success in implementing practicum activities is supported by several factors: teacher factors, mastery of the material and teaching techniques, and mastery of managing practicum activities ([Hasruddin and Rezeqi, 2012](#)).

The results of observations on practicum implementation activities in several public high schools throughout the city of Rantauprapat that practicum implementation activities can stimulate students and motivate teachers to make effective use of laboratories in practicum to improve student learning outcomes in evaluating the implementation of class X biology practicum. The

use of laboratories in several schools is still joining chemistry and biology to implement practicum becomes an obstacle to maximizing practicum activities. In addition, the laboratory management system is also not optimal. This is due to the absence of special personnel or laboratory assistants who can manage the laboratory. So that teachers in carrying out practical activities require a long time in preparing the equipment and materials needed. This causes the time used for practical activities to be less.

The assessment process and results of the implementation of the biology practicum conducted in the laboratory are part of the internal assessment, which determines students' learning outcomes on the mastery of the competencies taught by the teacher. The aim is to assess the achievement level of student competencies carried out during the learning process and at the end of the lesson ([Arikunto, 2014](#)).

All teaching and learning activities need to be evaluated is it can motivate teachers and students. With more active students in learning, improve their thinking processes. With evaluation, teachers can find out the achievements and progress of students to respond appropriately if students have learning difficulties. For students, evaluation is feedback about their strengths and weaknesses, encouraging better learning and increasing achievement motivation. Evaluation of students is carried out to find out how far the progress they have achieved. Evaluation is not only done by teachers but also by students to evaluate themselves (self-assessment) or self-evaluation ([Slameto, 2003](#)). Based on the description above, the expected objectives of this study are to determine the frequency, evaluation, and perceptions of students towards the implementation of practicum in SMA Negeri in Rantauprapat City.

METHOD

This research was conducted at SMA Negeri 1 Rantau Utara, SMA Negeri 2 Rantau Utara and SMA Negeri 1 Rantau Selatan located in Rantauprapat City, Labuhan Batu. The method used is descriptive with a population of all students of class X MIA in several public high schools throughout the city of Rantauprapat, with 535 students in the 2019/2020 school year. The sample in this study amounted to 107 students and three biology teachers.

The type of research used in this study is an explorative survey. This study aims to obtain information by conducting observations, interviews, and exploration using data collection

instruments in the form of questionnaires and direct observations and interviews with teachers in biology studies to get answers to problems and achieve research objectives.

RESULTS AND DISCUSSION

Practical Implementation

Based on the data obtained from the research conducted, it can be seen that the implementation of practicum in Middle Schools throughout the City of Rantauprapat is quite often done, wherein this study SMA Negeri 1 Rantau Utara most often carried out practicum in Biology

learning with a relative frequency of 83%. In more detail, the data on the frequency of practicum can be seen in Table 1.

Then to get the results of students' perceptions of the implementation of the practicum, a questionnaire analysis consists of several indicators, including; interest in laboratory activities, laboratory conditions, practicum implementation time, practicum preparation and implementation, and practicum evaluation reports. With each of the following percentages: 86.14%, 83.18%, 70.44%, 88.07% and 83.90% (Figure 1).

Table 1. Frequency of High School Practicum in Rantauprapat City

| No | School | Praktikum | | | | | | F | |
|----------------|-----------------------------|-----------|-----|-----|-----|-----|-----|---------|--------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | Absolut | Relative (%) |
| 1 | SMA Negeri 1 Rantau Utara | Yes | No | Yes | Yes | Yes | Yes | 5 | 83 |
| 2 | SMA Negeri 2 Rantau Utara | No | No | Yes | Yes | Yes | Yes | 4 | 66 |
| 3 | SMA Negeri 1 Rantau Selatan | Yes | Yes | Yes | No | No | No | 3 | 50 |
| Average | | | | | | | | 4 | 66 |

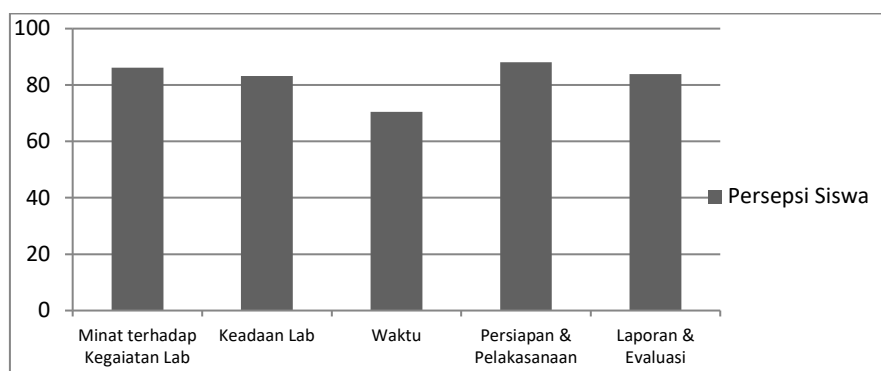


Figure 1. Students' Perceptions of the Implementation of Biology Practicum in Schools

Based on the study results, it can be seen that the frequency of practicum implementation is quite often carried out in three public high schools (SMA) in Rantauprapat City, with an average relative frequency of 66%. This means that teachers in schools take advantage of practical activities in learning to strengthen students' understanding of concepts.

In the 2013 Curriculum, the laboratory is an integral part of learning and teaching activities specifically for natural science subjects, including biology. This is because the 2013 Curriculum emphasizes more on learning activities that are student-centered learning (SCL), where students do more guided learning activities to find facts and information related to the material that is realized through a series of scientific activities, all of which can be done through a practicum in the laboratory.

The practicum method has more meaningful when compared to the conventional method, where the teacher conveys verbal information to students. This is supported by [Harsono \(2008\)](#) which states that conventional learning methods are considered less effective because 80% of the teacher's time is used to transfer knowledge to students in one way (one-way traffic) to students. Meanwhile, [Khamidah & Aprilia \(2014\)](#) argue that practicum will be more effective in improving students' skills in observing and improving skills and a means of practicing using equipment. In addition, with practicum, students can develop curiosity, be active, creative, innovative, and foster scientific honesty. According to [Wirjosoemarto et al. \(2002\)](#), practicum activities include planning stages (exposing ideas that can be tested or designing investigations), performance (manipulating, observing and collecting data), interpretation (data management, drawing

conclusions, applying concepts); and, communication (reporting and receiving information). These stages can be used as a vehicle for students to increase creativity by expressing ideas, increasing curiosity and learning motivation, critical thinking by practicing analytical activities, and communicating the information obtained.

In general, the frequency of practicum implementation in schools is critical to increasing after knowing and considering the benefits of implementing practicum in learning. This cannot be separated from the role of the teacher as a facilitator in learning activities. Practicum activities will run smoothly if the teacher can manage learning activities combined and matched with practicum activities. They were supported by the writings of [Purnomo et al. \(2014\)](#), which states that there is an influence of the role and guidance of teachers on improving student learning outcomes which are the benchmark in learning success.

Interest in Laboratory Activities

Figure 1 shows that 86.14% of students are interested in learning activities carried out in the laboratory. This data aligns with [Mahiruddin's \(2008\)](#), which states that practicum provides opportunities for students to fulfill their curiosity and desire to be able to. Having curiosity and willingness to master a skill is an example of an indication that someone has good motivation for something. Good motivation was also shown by students in this study, where students stated that they had a good interest (85.42%) and high enthusiasm (84.67%) in the implementation of the practicum.

The condition of students' good interest and high enthusiasm can be seen with students who prepare everything needed from home (78.69%) for the smooth process of carrying out practicum in the classroom. This means that students are eager to carry out a series of practicum activities from the start. The teacher's task is to utilize these students' learning spirit and enthusiasm to boost learning success.

Practice or practicum is a teaching and learning activity intended to strengthen the mastery of appropriate material. Through independent, guided activities and optimal use of practicum facilities as a unified whole in the practicum administration system, it is hoped that good learning objectives can be achieved ([Pertwi, 2013](#)). From students' perception, optimism will also be obtained high by students who feel they understand more about the subject matter of biology with the implementation of practicum with a percentage of 89.91%. This means that students

feel that implementing the practicum has helped them achieve their learning objectives well. Through practicum activities, students are expected to improve their analytical skills and work together to get used to doing everything in an orderly and structured manner.

The interest shown by students is also inseparable from learning activities that prioritize experience in the laboratory as a way to obtain and explore information related to the concepts that are the title of the practicum. [Suwanto \(2003\)](#) stated that the interaction between laboratory conditions and utilization of students' interest in learning, where good laboratory conditions and optimal laboratory utilization will increase students' interest in learning. In this study, 89.53% of students thought that practicum activities could help foster student interest in learning so that it was easier for students to understand the theory. [Yuniastuti \(2016\)](#) states that an increase in interest and motivation will affect students so that learning outcomes and students' understanding also increase.

Laboratory Condition

The implementation of practical activities can be carried out in the laboratory or outside the room. According to [Wiyanto \(2008\)](#), the role of the laboratory is vital in learning. Among these roles, the first is as a place to develop skills through a scientific approach. Second, the laboratory can also be used as a vehicle to prove the concepts that have been discussed previously. Third, the laboratory can also be used to develop thinking skills through a problem-solving process when students find their concepts following practicum procedures that the teacher has prepared.

This study found that students' perceptions of the laboratory conditions were quite good, whereas 82.99% of students felt comfortable in the laboratory. In addition, the laboratory is equipped with other supporting factors such as each laboratory in the school that is used as a sample in the study, namely: having good air ventilation (83.18%); adequate lighting (83.93%) obtained through windows and lights in the room; the tables and chairs provided are sufficient for the number of students (87.66%) so that students do not need more preparation to bring chairs from the classroom; access to affordable electricity and water (81.31%) to carry out practicums; sanitation/cleanliness during and after practicum activities was carried out in the laboratory wherefrom the three schools in Rantauprapat City it was found that teachers always asked the student party to clean the laboratory after the practicum was carried out (84.67%) so that the

laboratory floor was always kept clean (81.12%); as well as adequate tools and materials for the smooth running of the practicum (82.99%). The three sampled schools in this study had periodically restocked the tools and materials used in the practicum. [Yaman \(2016\)](#) emphasized the importance of procuring tools and materials in the laboratory to complement or replace tools and materials damaged or used up during practicum activities. Procurement of tools and materials is carried out by collecting data on the need for tools and materials from subject teachers. The teacher must provide a list of submissions for tools and materials needed in the practicum, which is adjusted to the student worksheets/practice guides for further procurement.

[Novianti \(2011\)](#) suggests that laboratory utilization will be maximized with supported by a management system or management that has been regulated in the Permendiknas. Laboratories in schools must be managed and empowered to get to the ideal laboratory (Yemeni, 2016). The three laboratories in public schools in Rantauprapat City are ideal enough with the conditions and intensity of use and maintenance frequent by teachers and participants.

Availability Time for Practicum

If viewed from the perception of students in general, the time allocated for practicum activities in the laboratory is considered sufficient (77.76%), where the division of time allocation carried out by a combination of activities in the classroom and laboratory is sufficient for students. Scheduling has been done well (82.99%) through the coordination carried out by Biology teachers in schools with laboratory managers. However, students still want to increase the time allocated for practicum in the laboratory (59.32%). This means that many students still feel that the time allocated for one practicum is insufficient. Based on the interviews with teachers several times, teachers and students have to take time outside of class hours to complete the practicum. In line with the research results obtained by [Rifai et al. \(2016\)](#), the lack of time allocation used during practicum in the laboratory so that teachers are forced to add another schedule or switch to another learning model to replace the practicum. The lack of time allocation causes delays in the implementation of the practicum on the following material. From the study results, it was obtained that 64.30% of the practicum implementation for the following material had to be postponed to complete the unfinished practicum.

The allocation of time for implementing the practicum should be a primary concern for

teachers and laboratory heads at schools. Practicum scheduling that is carefully planned and preparing everything needed before the practicum is very important. It was found in one of the schools sampled in this study that often activities outside of the work procedure step are the main inhibiting factors in the implementation of the practicum, an inventory of tools and materials in the laboratory which is irregular and organized requires time that drains lesson hours to look for material tools. Required. [Yaman \(2016\)](#) stated that to organize the tools and materials used in the practicum. Several things need to be done, including cleaning the laboratory along with the available storage areas for tools and materials such as cabinets, drawers, and shelves; list tools and materials in terms of quantity, physical properties, prices; and grouping tools and materials according to subject groups (physics, biology, chemistry) or according to the catalog referenced. Thus, it is crucial to organize and manage the inventory of tools and materials in the laboratory to avoid obstacles hindering practicum activities.

Practicum Preparation and Implementation

[Widodo and Ramdhaningsih \(2006\)](#) divide the practicum into three stages. The preliminary stage plays an important role in directing students about the activities to be carried out. This stage includes linking the activities to be carried out with previous activities, explaining the work steps that students must carry out, and motivating students. Second, the Work Phase is the core of the implementation of practical activities. At this stage, students work on practical tasks, for example assembling tools, measuring, and observing. The third stage is closing, where the results of observations are communicated, discussed, and conclusions are drawn.

In this study, it was found that 91.59% in the preliminary stage, the teacher as a facilitator helped students to prepare everything needed in practicum activities, one of which was by telling students to bring tools and materials that were not available in the laboratory from afar. The teacher will usually divide the students into several groups (96.07%) and check the completeness of the tools and materials in each group before starting the practicum (88.41%). Next, the teacher will give a brief explanation in the form of a general description of the practicum activities and their relation to biological theory (95.14%), and inform the students about the objectives of the practicum (94.02%) so that the practicum is more precise and more focused.

Students always make observations/experiments at the working stage accompanied by the teacher (81.68%). The problem is that there is only one teacher who cannot handle several groups at once. This problem is also caused by two of the three schools sampled do not have a laboratory assistant. Students will usually use books/LKS to guide practical work procedures (84.86%) to overcome previous obstacles, but not all schools have unique worksheets for practical activities. Some get them from printed books used by students. However, students did not experience difficulties regarding how to operate the tools (94.95%) because they had been given a demonstration of the use of the previous tool by the teacher or laboratory assistant, which increased the practicum success factor (86.73%).

Practical Report and Evaluation

As previously explained by [Widodo and Ramadhaningsih \(2006\)](#), finding that after the practicum is completed does not mean that the practicum activity is over. At the closing stage, the results of the observations are communicated, discussed, and conclusions are drawn. From the results of teacher interviews and analysis of student questionnaire instruments, teachers always assign students to make practical reports (90.28%) as material for evaluating student performance in the laboratory. Reports can also be used as a measuring tool for how students understand the concept and its relation to practical activities. The teacher will usually take the evaluation value from the value given in the practicum report (87.48%). As a joint evaluation material, the research results will usually be discussed together again in class (90,47). In this stage, students' report is used as learning material to be reviewed and discussed together because the report contains the concepts seen/tested in practice.

A complete evaluation should be carried out to get a complete practicum value starting from providing a pretest, evaluation of the cognitive, affective, and psychomotor students combined with the value of the practicum report as the output of practicum activities. However, based on

the results of this study, the authors found that teachers rarely gave pretests to students before starting the practicum (68.41%). Apart from being an evaluation tool, tests are very closely related to improving student learning outcomes because providing tests in learning can increase students' learning motivation ([Effendy, 2016](#)). However, students feel that their practical value is sufficient and following what they do in the laboratory (88.97%).

Evaluation of Practicum implementation

The practicum evaluation is carried out with the instrument of learning outcomes test questions containing various materials based on the practicum carried out in the field. Materials can be categorized based on 3 (three) primary materials in class X, namely Biodiversity material, Archaeobacteria and Eubacteria, and Protista material. More detail can be seen in the description of tables 2, 3, and 4.

From table 2, it can be seen that the average achievement of learning outcomes on biodiversity material is 55.48, with a moderate category. In Table 3, it can be seen that the average learning outcomes for archaeobacteria and eubacteria are 56.70 in the moderate category. While in Table 4, the evaluation value of special practicum on Protista material has an average of 66.45, categorized as good.

After the final evaluation in the practicum, the average student evaluation value was 59.60%, with a moderate category. This is considered less than the maximum and can still be improved again. The value that is less than the maximum is thought to be caused by several influencing factors. One of them is the cooperative learning model used in the practicum, which has several weaknesses, including; 1) the teacher must prepare to learn carefully, besides that learning requires more energy, time, and the teacher's mind, 2) so that the process runs appropriately, adequate facilities are needed, 3) during group discussions there is a tendency for the topic of the problem to widen, 4) when While the discussion is sometimes dominated by one person only so that other students seem passive ([Isjoni, 2009](#)).

Table 2. Recapitulation of Evaluation Value of Biodiversity Material Practicum

| Category | Range (%) | Frequency | | Average |
|--------------|-----------|------------|-------------|---------------------|
| | | Absolut | Relatif (%) | |
| Very good | 81 – 100 | 24 | 23 | 55,48 (moderate) |
| Good | 61 – 80 | 26 | 24 | |
| Moderate | 41 – 60 | 28 | 26 | |
| Low | 21 – 40 | 16 | 15 | |
| Very low | 0 – 20 | 13 | 12 | |
| Total | | 107 | 100 | - |

Table 3. Recapitulation of Evaluation Value of Archaeobacteria and Eubacteria Material Practicum

| Category | Range (%) | Frequency | | Average |
|--------------|-----------|-----------|-------------|---------------------|
| | | Absolut | Relatif (%) | |
| Very good | 81 – 100 | 10 | 9 | 56,70 (moderate) |
| Good | 61 – 80 | 47 | 44 | |
| Moderate | 41 – 60 | 27 | 25 | |
| Low | 21 – 40 | 8 | 8 | |
| Very low | 0 – 20 | 15 | 14 | |
| Total | | 107 | 100 | - |

Table 4. Recapitulation of Evaluation Value of Protist Material Practicum

| Category | Range (%) | Frekuensi | | Average |
|--------------|-----------|-----------|-------------|-----------------|
| | | Absolut | Relatif (%) | |
| Very good | 81 – 100 | 12 | 11 | 66,45 (Good) |
| Good | 61 – 80 | 58 | 54 | |
| Moderate | 41 – 60 | 18 | 17 | |
| Low | 21 – 40 | 16 | 15 | |
| Very low | 0 – 20 | 3 | 2 | |
| Total | | 107 | 100 | - |

Teachers as educators have limitations in controlling the activities carried out by students in practicum, mainly if the class is divided into several small groups. The teacher cannot simultaneously guide the group to complete practicum activities correctly and adequately, so there are often differences in the practicum results obtained by students in the laboratory.

The facilities provided by the school are also a determinant of the evaluation results that are less than optimal. Because basically, not all schools have adequate facilities, wherefrom the results of the study it was found that some schools still have a shortage of tools, for example, the number of microscopes used for practicum is not adequate in terms of number or feasibility because some microscopes cannot be used because they are moldy. Then the domination by students against their friends in their group makes them unable to answer evaluation questions correctly because they are not used to analyzing or have not found facts obtained through practical activities.

Evaluation is essential to find out where the error is in the steps or technical learning. After the evaluation, the teacher can determine what the proper steps need to be done next. If the learning outcomes are categorized as incomplete or less than the maximum, the teacher can do remedial teaching (Remedial Teaching). According to [Ahmadi and Supriono \(2014\)](#) in their writings, remedial teaching aims to make students who have learning difficulties achieve the expected learning achievements through improvement. Remedial teaching can be done by repeating the

practicum by paying attention to the evaluation results in the previous practicum.

However, it does not necessarily mean that remedial teaching must be carried out. Teachers must pay attention to the percentage of students who have learning difficulties. In this study, students who did not meet the expectations of the evaluation scores based on the low and very low categories were 8%. This means that teachers do not need to repeat learning through practicum but explain the concept by giving assignments or group discussions. Based on the results of interviews with teachers, students will be given assignments or group discussions if the practicum is deemed inadequate, either due to lack of time or other things.

CONCLUSION

Based on the research and data analysis that has been carried out, it can be said that The frequency of the implementation of Class X MIA biology practicum in SMA Negeri in Rantauprapat City is quite often done with an average relative frequency of 66% for each school. Evaluation of the implementation of class X MIA biology practicum in SMA Negeri in Rantauprapat City obtained an average evaluation value of 59.60, which was categorized as sufficient. Students' perceptions of the implementation of Class X MIA biology practicum at State Senior High Schools throughout the City of Rantauprapat include several indicators, including interest in practicum activities by 86.14%, practicum activities by 83.18%, time by 70.44%, preparation and

implementation of 88.07%, and reports and evaluations of 83.90%.

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