

ENHANCING STUDENTS' LEARNING ACTIVITY AND ACHIEVEMENT IN THE INVERTEBRATE SUBTOPIC THROUGH LABORATORY WORK

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ABSTRACT

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The objectives of this study were to find out and knowing the effect of laboratory work on students' learning activity and learning achievement on the topic of annelids and molluscs. This study was classified as quasi experimental with two group pretest – posttest design. This study was implemented at MAN 1 Medan grade X; samples of this study determined by cluster random sampling and obtained X-7 as experimental class and X-6 as control class. The study variable were consist of dependent variable, they are students' learning activity and students' achievement while the independent variable were using practicum method in experimental class and traditional method in control class. This study used test and non test instrument. Test instrument was cognitive test in form of multiple choice and essay whereas non test using observation sheet.

The data analysis method was using t-test. The study result shows that involvement level of students' learning activity on experimental class was higher than control class (62% > 45%). It means students' learning activity in learning invertebrate subtopic that taught by practicum method more active than taught by traditional method. Average score of students' achievements on experimental class was 83 (increase 34.17 point from pretest) and control class was 71.5 (increase 22.33 point from pretest). There was a significant difference between students' achievement mean score on experimental class and control class then laboratory work have positive effect on students' learning achievement in learning invertebrate subtopic at MAN 1 Medan.

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Introduction

Teaching and learning is a process that contain a series of actions from teacher and student based on reciprocity. Interaction or reciprocal relationship between teacher and student is a key condition for the continuity of the learning process. It's take place in educational situations to achieve certain goals (Arends, 2009). One of learning goals is to deliver students in achieving the learning objectives in accordance with the basic competencies and competency standards that have been set. Achievement of basic competence is not easy. In learning activity, students are often difficult to capture learning material that presented by teacher so need efforts to improve the achievement of these outcome.

So far in Indonesia education management, learning process in the classroom as if it was completely on the authority of teacher. So, to make students can remain active in the following learning activity, need to be selected the type of activities that are interesting or fun for the students. Implementation activities should be varying, not only in the classroom, it can be outside as in the library, laboratory, museum and others. Application of the model learning by doing is highly recommended (Depdiknas, 2008). Furthermore, Atilla Çimer (2007) notes that there are many different methods and strategies have been suggested for involving students in lessons and engaging them in active learning and also to improve the success of students in the learning process, such as questioning, role playing, Inquiry-based teaching and learning, and also laboratory work.

However, traditional method in the form of lecturing is the famous one that applied by teacher in teaching and learning process. In lecturing, which is mainly one-way method of communication that does not involve significant audience participation, basically the content of learning delivered by teacher to class and then student listening, because of that student have a little role in their learning process and tends to be passive. It has been found that teaching biological sciences in senior secondary with lecture method has less effective. However, learn subject matter through lecture method can be highly stimulating if delivered by talented teacher (Ahmad, 2010).

Biology is one of science subject matter that have a lot of abstract concepts, events, topics and facts that students have to learn, and it is generally based on memorization. Atilla Çimer (2012), for instance, revealed that memorization as a biology-learning strategy is common among secondary student as several studies of Turkish biology teachers and students. Students may consider that biology hard to learn and just the memorization of factual knowledge when learning activities do not appear to be relevant to students' daily lives and do not include laboratory work or experiment. Invertebrate is topic in biology that is considered difficult by grade X students because this material contains a lot of memorizations about the characteristics and classification of invertebrate. Much of invertebrate learning material that must be taught lead teacher tends to not use variations in their learning activities. The lack of variation in students' learning experience resulted boredom in learning, feedback to be low, as well as students become passive and ultimately lead students' achievement in biology decreased.

Informal questionnaire was distributed to students' grade X to knowing whether they willing to learning invertebrate with laboratory work, and obtained that they need variation in learning and teaching process, it means that they want to do laboratory work in learning invertebrate and that willing have possibility based on their thinking that studying invertebrate just filled with remembering and memorizing and it does not make learning become interesting. Also interviewing the teacher of Biology grade X MAN 1 Medan, based on that knowing during this time they are more likely using cooperative learning model type jigsaw, but even so the learning achievement of students are still not satisfactory, not reaching KKM (KKM is 82). Another Biology teacher said that in learning invertebrate they did not using laboratory work, this is probably caused by some reason, such as the deadline for completing all learning material and also lack of tools and materials for work in laboratory.

In addition, researcher still saw teacher-centered in MAN 1 Medan where teacher was still active as a conduit of information and dominate classroom learning. And it focused on rote learning and drills are most likely due to large amount of material that has to complete in a relatively short

time. Although students no longer considered as learning object but in the reality, learning material still determined by the teacher. It still looks less capability to optimize the development of students; involving creativity, taste, and intention, as well as students has less opportunity to think critically, logically, creative, and innovative.

These problems should be overcome in order to achieve the learning objectives with optimal result and make student more active in learning process. Applying laboratory work can be used as attempt to overcome it. Laboratory work is one of activity that was instrumental to increasing the success of the learning process, Rustaman (in Sudargo, 2009) suggests that in science education, laboratory work is an integral part of teaching and learning activities, especially Biology. This shows how important the role of laboratory work to achieve educational goals. According to Rustaman there are four reasons for the importance of laboratory work activities that (1) can arouse students' learning motivation, (2) develop the basic skills of conducting experiments, (3) as media for studying the scientific approach, (4) support the subject matter.

Laboratory work may engage students in learning because it allows students to learn topics through various cognitive activities, for example, doing, watching, touching, talking, thinking, and discussing, as stated that students' cognitive structures will grow only when they initiate their own learning experiences, thus teaching and learning biology might be more effective if through laboratory work.

Slis's research result (Sudargo, 2009) states that posttest value of students which treated with laboratory work improved significantly compared to students which is treated with traditional method. White also summarize some of the researches, it was revealed that students more easily understand the concepts learned through laboratory work activities and also it can be increasing students' interest and motivation in learning science. Thus, this research conducted in order to knowing whether laboratory work had positive effect on student's learning activity and learning achievement.

Methods

This research was conducted in MAN 1 Medan which located on North Sumatera, Indonesia. The time of research was on even semester, A.Y. 2024/2025 and start from April up to May 2025. The population in this research is all grade X, regular class students in MAN 1 Medan. For determination of sample, researcher uses a cluster random sampling, each class have the same opportunity to be research sample. There was two classes as research target, one as experimental class that have been taught with practicum method and another one as control class using traditional method.

There are two different variables, namely independent variable: practicum method and traditional method, and dependent variable: students' learning activity and learning achievement. There are two type of instrument that used in this research; namely test and non-test. The test instruments for cognitive achievement were pretest and posttest, in the form of multiple choices and essay test. Meanwhile non-test instruments were observation sheet of students' activity when practicum and traditional method applied in teaching and learning invertebrate.

The test that used was cognitive achievement test of annelid and molluscs topic consisting of 17 items. The tests was given twice, namely pretest and posttest. Before tested to objects, questions of this test validated to students who have studied invertebrates and to lecturers for validating the content of test.

Method of this research is quantitative with quasi-experimental. Quantitative research is research with the data in the form of numbers and analyzes using statistical. While the quasi-experimental method is a research method used to find the effect of certain treatment. The study was designed to knowing how effect of practicum method in teaching annelids and molluscs topic and determine the level of relations between learning activity and learning achievement.

Result And Discussion

The data in this research are the involvement level of students in learning activity and student achievement that got from experimental class using practicum method and the control class using traditional method. To find out the students' learning activity was used observation sheet.

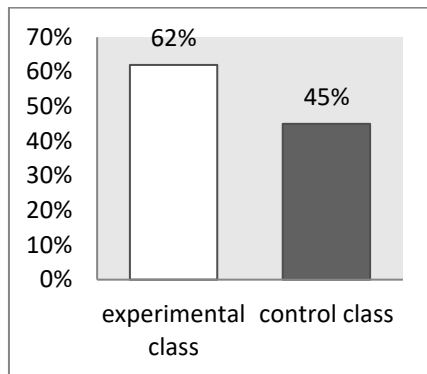


Figure 1. Difference of involvement level on students' learning activity in learning

For score each aspect can be seen below :

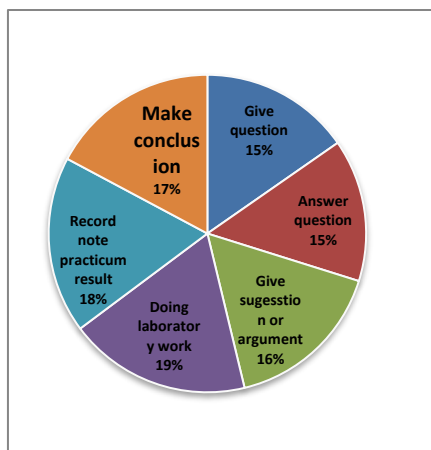


Figure 2. Student involvement level in experimental class of each learning activity aspects

Figure 2 represent students (experimental class) involvement level each aspect of students learning activity, those pie chart summarize the data in range 100% and doing laboratory work has highest score 19% and categorize as active.

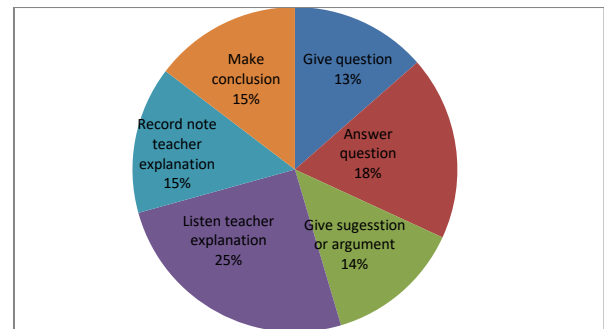


Figure 3. Student involvement level in control class of each learning activity aspect

Based on the calculation, the pretest score of experimental class obtained lowest score is 30 and highest score is 70 and the largest frequency present in score 45 and 55. While the pretest score of control class obtained the lowest 30 and highest 70 and the largest frequency is 50. For posttest score of the experimental class obtained the lowest score is 70 and highest score is 95 and largest frequency present in score 80. While posttest score of control class obtained lowest 55 and highest 85 and largest frequency is 75.

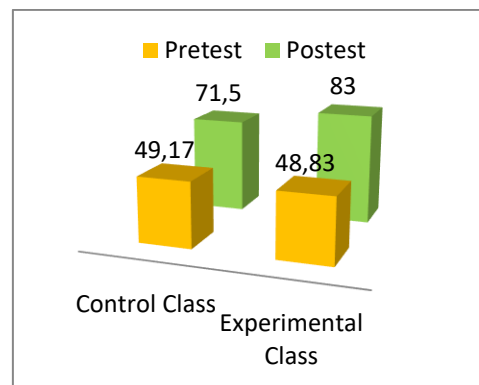


Figure 4. Pretest and Posttest Score of Both Sample

In this research. taken 2 classes as samples namely class X-7 using practicum method and X-6 with the traditional method. Student learning activity was observed when teaching and learning process takes place. Based on the calculation get that experimental class categorize as active while control class categorize as fair.

Based on observation sheet get that experimental class was fair in answering question, this is most probably because students busy to doing laboratory work, busy observing specimen, because of that students in experimental class tend to giving question (57%) than answering question

(54%). Opposite condition occurs in control class, where involvement level of answering question (50%) was higher than giving question (37%), this is most probably because students in control class only receive all of what researcher said and it does not stimulate any new questions, and if the researcher asking questions about what have been studied then students able to answer. And both sample most active at point 4 namely doing practical work for experimental class and listen to teacher's explanation for control class.

Before giving different treatment on both sample, researcher give a pretest to see the students' basic knowledge about annelids and molluscs subtopics.

After being given the treatment then at the end of the lesson posttest was given and obtained mean score learning achievement of experimental class was 83 and control class was 71.5. Accepted which proved that practicum method has a positive effect on students' learning activity and achievement and this can be seen from the level of activity and the average score obtained by experimental class higher than the control class.

Based on syntax of laboratory work, first step was problem orientation, in this phase researcher tell students what they have to done and gave the worksheet. Second step was problem formulation, actually in this step researcher did not let student to formulate problem of laboratory work because activity that done in laboratory more likely verification and observation instead of investigation. Third step was conducting laboratory work. Fourth was overcome the difficulty, in this step researcher help student to understand the practical guidance and how to fill the worksheet. The last was reflecting result of laboratory work, in this step student should present their result and together with researcher linking the result of laboratory work with theory but it did not happen. Thus in contrast to the control class that using traditional methods, enthusiastic students in the following learning process is quite low, so it is difficult for researcher to maintain the concentration of students in learning. Although the

motivation and encouragement to be continue provided to students but learning atmosphere seem ordinary. Based on the research findings, it can be said activity and student learning achievement using practicum method was better than traditional methods. It is prove that the use of practicum method in the learning process was needed particularly in the learning invertebrate to accelerate and facilitate the achievement of learning objectives and can eliminate students perception about biology was lesson with a lot of memorizing. This suggests that the learning activity is not only influenced by intrinsic factors on students but also influenced by extrinsic factors, so it can be said learning interest can arise when students interact with the a person or object or environment or a particular activity.

The research results of Slis, Donald in 2005 (in Sudargo 2009) , states that the post-test value of students treated with active learning (practicum) increased significantly compared to students that were subjected to passive learning (lectures). Implications of this research are practical learning can help students to learn and understand the concepts better, since laboratory work make students should prepare themselves before learning process take places.

Generally the experts say that practicum can support students' understanding of biological material. Practicum provide opportunity for students to prove the theory and others. Many concepts and principles learning science established in the minds of students through the process of generalization of facts that observed in lab activities.

There are at least four reasons about the importance of laboratory work. First, raise the motivation to learn science. Second, the laboratory work develops basic skills carry out the experiments. Third, laboratory work become subordinate scientific approach. Fourth, practical support comprehension of learning materials (Nurmaya, 2012).

Conclusion

Based on the results using laboratory work (practicum method) in teaching and learning annelids and molluscs, it can be concluded that: Mean score of students' learning activity was higher when they have been taught using practicum method and it means that they are more active compare with student that have been taught using traditioinal method. Average score of students' learning achievement who have been taught using practicum method was higher than using traditional method. The use of practicum method has positive effect on students' learning activity and learning achievement compare with traditional method.

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