



The Influence of Guided Inquiry Learning Using Flash Based Invertebramedia on the Senior High School Students' Learning Achievement

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Abstract

This research aims to know the influence of guided inquiry learning with flash based Invertebramedia on the learning outcome of senior high school students. The research was done in SMA N 1 Pamotan using Quasi Experimental Design. The sample of the study was X MIPA 1 class (experimental group) and X MIPA 2 class (control group) which was taken by purposive sampling technique. The results showed that there were increasing of cognitive's learning outcome of the experiment group was 80% and control group was 34.2%. There was a significant difference in the average of cognitive learning outcomes of the experimental group and control group. Analysis of affective and psychomotor aspects showed that learning outcome the experimental group higher than the control group. So, the activity of students during learning process was enhancement. The average of the student's questionnaire responses after joining the learning was 84.9% in good criteria. The teacher and the students also gave good responses on the implementation of the learning in general. The conclusion of the research is the application of guided inquiry learning with Invertebramedia based on flash influence on high school student's learning outcomes.

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INTRODUCTION

The concept of Biology materials, especially for second semester for tenth grade demands students to have the ability in identifying and categorizing living things and also understanding their function for life, for instance animalia chapter. In the animalia chapter, students are demanded to attain the basic competence which is applying classification concept for categorizing animal to the phylum based on the morphology and anatomy characteristic, presenting data about comparison of complexity of animal body compiler and its function in life (Permendikbud, 2016).

Based on the observation result with Biology teacher and students of SMA N 1 Pamotan, students had not understood and find out the concept of invertebrata materials. This is because invertebrata materials not only consists of many phylum and scientific names which are difficult to understand and also students have to memorize the scientific names of the species that makes students are not excited and becomes passive in the learning process. The average of classical mastery of daily test on invertebrata materials is 39% with Minimum Criteria of Mastery (KKM) is 70. Biology teacher of SMA N 1 Pamotan should have given the invertebrata materials in the detail and systematic way. The use of the learning method and media is quite well yet it will be better if there is variation in the model, media and method in the learning process. So, students get higher spirit and motivation during learning process and the students' learning result gets higher also.

The appropriate learning for the problem in the SMA N 1 Pamotan can be handled by using approach, strategy, metode and innovative learning model. One of the learning models which can be used for finding out invertebrate concept is guided inquiry learning. According to Deviani *et al.* (2016), guided inquiry learning is a learning model which student is guided to get knowledge by themselves. The effective learning strategy for solving the problem in the finding materials concept is guided inquiry learning. This learning engages students in the investigation, analysis thinking and teamwork (Simonson & Susan, 2013).

The principal of guided inquiry learning gives stimulate questions which guide students to provoke students' curiosity before learning a subject. It also prepares the students to think critically in solving a problem by group discussion. As a result, student is not only able to interact with the teacher through the questions but also with the other students through group work (Safufia *et al.*, 2016).

The inquiry and discovery approach can increase the students' learning result on Biology materials (Sari *et al.*, 2016). The result of research which was conducted by Rahayu *et al.* (2014) showed that guided inquiry learning could increase the students' learning result in the cognitive, affective, and psychomotoric aspect. Moreover, guided inquiry in this study engages students in looking for information, systematic, logic, and analytic investigation on discovered problem. So, students can formulate their discovery of problem in the invertebrata materials through questions on Students Discussion Sheets with teacher guidance.

The application of guided inquiry learning needs to be supported by innovative learning media which is expected can help students in understanding the materials and improving the learning interest. Martono & Oky (2014) explained that interactive multimedia can increase the students' spirit and motivation in finding out the learning concepts. Furthermore, about 95% students enjoyed the learning media and only 5% that did not enjoy. This statement is supported by Prasetyaningsih (2015), the application of computer based learning media (Adobe Flash CS5 media) can improves students' ability, makes the interesting and exciting learning process, that learning process becomes more effective. The attractiveness of flash based learning media of Sciences subject according to students and teacher's responses shows about 0.85 or 85% with well done criteria.

Flash-based Invertebramedia (Invertebrate Smart Media) is a flash-based invertebrate learning media that will be used to support guided inquiry learning. Therefore, Flash-based Invertebramedia is expected to help students think more concretely on some examples of

invertebrate's phyla. The purpose of this media is to improve the students' attractiveness in understanding the material as well as increasing students' interest in learning. Guided inquiry learning by using Flash-based Invertebramedia is expected to facilitate students in understanding the invertebrate material to improve student's learning outcomes.

RESEARCH METHOD

This research was conducted in SMA N 1 Pamotan in even semester of academic year 2016/2017. This research used quasi experimental design with nonequivalent control group design (Sugiyono, 2015). The research used two classes as sample which were experiment class (Class X MIPA 1) and control class (Class X MIPA 2). Sampling was determined by purposive sampling technique.

The data collected in the form of main data and supporting data. The main which was the learning outcomes was used to measure the cognitive aspects of students through the question of multiple choices. The validity, reliability, and difficulty and distinguishing power of test's questions had been tested also. The test question was given at the beginning of the meeting as a pretest and at the end of the meeting as a post-test. Supporting data was obtained from observation sheet of student activity both affective aspect and psychomotor aspect, and student and teacher response. Student activity observation sheets were taken during the learning by the observer. While the students' and teachers' responses were taken after the learning ended through a student's questionnaire and interviews with the teacher. The lessons which was applied in the experimental class was corresponded to the guidance syntax of guided inquiry learning supported by *flash*-based Invertebramedia, while learning in the control class with lecture models and using learning resources from schools.

Methods of data analysis in this study were data analysis of students' cognitive learning outcomes from pretest/posttest score (N-gain test, normality test, homogeneity test and t test), analysis of student activity (affective and psychomotor aspect), student response analysis, and analysis of teacher's responses to guided inquiry learning process based on Flash-based Invertebramedia.

RESULT AND DISCUSSION

The implementation of guided inquiry learning by using Flash-based Invertebramedia

Implementation of guided inquiry learning model has steps that encourage students to construct their own knowledge through direct observation of the observed object. In this research, the implementation of stages of guided inquiry learning activities was done well. The guided inquiry learning stages consist of 5 scientific stages including formulating problems, hypothesizing, performing specimen observations, collecting and analyzing data and making conclusions. At the beginning of the meeting, students still tended to feel difficulty in doing the stages of guided inquiry learning model. It was because students were not used to work with this learning model. However, at the next meeting students tended to be active and their learning outcomes was increased during the learning process.

In this study, the application of guided inquiry learning was supported by *flash*-based learning media that was *Flash* based Invertebramedia. Flash-based Invertebramedia was applied after students hold group discussions as reinforces of invertebrate material concepts. *Flash*-based invertebramedia gave a positive impact to students which were able increasing students' motivation and spirit in studying invertebrate materials. This can be seen from the results of student learning after following the lesson and from teacher and student's response data about the applied learning.

Student cognitive learning outcomes

The students' cognitive learning outcomes of the experimental class and the control class were derived from the pretest and post-test scores. N-gain test was used to find out the increase of class of cognitive learning result of experiment and control class before and after learning. The N-gain test results are presented in Table 1.

Table 1 Result of N-gain test calculation of cognitive learning result of experiment and control class.

Criteria	Class			
	Experiment		Control	
	Amount	%	Amount	%
High	28	80	12	34.2
Medium	7	20	23	65.7

From the calculation using the N-gain test, the result of the improving of students' understanding on the experiment class was better than the control class. So, it could affect students' cognitive learning outcomes and their classical mastery also increased. It could be caused by several factors such as the atmosphere and the learning media which was used. The atmosphere and fun learning media help students to exchange information through interaction between teachers and students.

The result of normality and homogeneity test showed that the cognitive learning outcomes of students of experimental and control class were normal and homogeneous distributed with significant level $\alpha = 5\%$. Furthermore, we tested the difference of two means using parametric statistic test, t test. The calculation of the t test of the experimental and control class is presented in Table 2.

Table 2 The calculation results of the difference between the two means of experimental and control class

Class	dk	t _{score}	t _{table}	Information
Experiment	68	7,593	1,999	There is a significant difference
Control				

The increase of student learning outcomes was significant (significantly different) based on the t test with $t_{count} > t_{table}$ that was $7,593 > 1,999$, so the average of cognitive learning result of experiment class student was higher than average of control class learning result.

This result showed that in the experimental class which was taught by guided inquiry learning flash-based invertebramedia can improve the students' ability in understanding the concept and the invertebrate material. Implementation of guided inquiry strategy can improve student learning outcomes (experimental class) because this learning strategy provides great motivation to students through the raised problems, so students became actively involved in learning and interested to explore the concept.

The results of this study were in line with the results of a research which was conducted by Matthew & Igharo (2013), that the guided inquiry learning model is better than conventional learning model in improving students' cognitive achievement significantly. The results of this study were reinforced by the results of research which was conducted by Rahayu *et al.* (2014). In her study, she stated that guided inquiry learning can improve the completeness of the experimental class rather than the control class covering all aspects of learning such as cognitive, affective and psychometric aspects of the students. In this study, guided inquiry learning has a positive effect on

student learning outcomes. This is in line with research from Reynolds & Chiu (2012), they stated that discovery learning has a positive impact on learning outcomes with increased student motivation during learning *discovery learning* so students became more active.

Students' learning outcome

The result of student activity in this research covers affective aspect (attitude) and psychomotor aspect (skill) of students in experiment and control class. In the learning process, student observation discussion was done in a group. The students were divided into 8 groups of 4-5 students. Assessment of attitudes (students' affective) was done by three observer and one observer assessed 2 to 3 groups. Indicator of the students affective aspect assessment consists of 5 observed aspects that were honesty, discipline, responsibility, cooperation, and responsiveness. The student's affective learning outcomes of the experimental and the control class is presented in Table 3.

Table 3 Recapitulation of students' affective aspects of the experimental class and control class.

No	Affective Aspects	Experiment class per meeting (%)				Control class per meeting (%)			
		I.	II	III		I.	II	III	
1.	Honest	90.0	91.4	92.9	91.4	80.7	83.6	82.1	82.1
2.	Discipline	83.6	85.0	87.9	85.5	75.7	77.9	79.3	77.6
3.	Responsible	84.3	87.9	89.3	87.1	75.0	80.0	80.0	78.3
4.	Cooperation	84.3	84.3	89.3	86.0	77.1	85.0	82.9	81.7
5.	Responsive	72.1	75.0	77.1	74.8	57.9	58.6	60.0	58.8
Average of each meeting (%)		82.8	84.7	87.2		73.3	77.0	76.8	
\bar{X} end (%)		84.9				75.7			
Criteria		Very good				Good			

The result of the student affective aspect value analysis shows that the experimental class got higher than the control class. The percentage of the affective score of the experimental and control class increased at each meeting in student activity during the lesson. Thus, the guided inquiry learning that was applied in addition to improving student learning outcomes in the cognitive domain also improves student learning outcomes in the affective domain.

Student's Psychomotor Competency Assessment was performed when students hold discussion/observation and presentation of each meeting. Indicator of psychomotor aspect in this research consists of five observed aspects: students' ability to formulate problem, make hypothesis, observe specimen, collect and analyze data and make conclusion of result of discussion/observation (presentation). The calculation of students' psychomotor learning outcomes and experimental class is shown presented in Table 4.

Table 4 Recapitulation of students' psychomotor aspects of experimental class and control class

No	Psychomotor Aspects	Experiment class at each meeting (%)				Control class at each meeting (%)			
		I.	II	III		I.	II	III	
1.	Ability to formulate problems	85.7	87.9	88.6	87.4	75.0	80.0	81.4	78.8
2.	Ability to create hypotheses	80.0	81.4	85.0	82.1	73.6	75.0	77.7	75.2
3.	Ability to apply to specimens	87.9	89.3	89.3	88.8	74.3	75.7	78.6	76.2
4.	Ability to collect and analyze data	84.3	86.4	89.3	86.7	75.7	74.3	76.4	75.5
5.	Ability to make conclusions	80.7	81.4	82.1	81.4	72.1	70.7	70.7	71.2

Average of each meeting (%)	83.7	85.2	86.8	74.1	75.1	76.8
\bar{X} end (%)	85.2			75.3		
Criteria	Very good			Good		

The result of the psychomotor aspect value analysis showed that the experimental class was higher than the control class. Moreover, the guided inquiry learning that was applied besides improving student learning outcomes in the cognitive and affective domain; it also improves student learning outcomes in the psychomotor domain.

The result of the study above was in line with research by Riyadi *et al.* (2015). He stated that guided inquiry learning model can improve the skill of science process and student achievement in terms of knowledge (test), attitude aspect (questionnaire) and skill aspect. Based on the analysis of student's activities, affective and psychometric aspects showed that the experimental class was higher than the control class. This was also in line with research by Mawarsari *et al.* (2013) that the process of inquiry learning was guided from the formulation of the problem to make the conclusion really invited students to be active in following the learning process. Students were not only asked to make observations but students were also indirectly taught to develop a scientific attitude.

In the learning process, guided inquiry learning model was supported by flash-based invertebramedia learning media. Flash-based invertebramedia served as a supporting medium after the application of guided inquiry learning. It meant that this media was used to strengthen students' understanding in studying invertebrates. The use of learning media can visualize the material becomes more interesting and easy to understand by students. It perhaps due to flash-based invertebramedia was showing examples of animal pictures, supporting / video information, and evaluation questions. When Flash-based Invertebramedia was displayed, students were enthusiastic and gave feedback to each other (communicative). This was in line with research from Leach (2017) that learning media can lead to interactive learning, eliciting communication and student appeal so that students' comprehension skills increase.

The response of teacher and students toward guided inquiry learning flash-based invertebramedia

The student's response was a feedback or response given by the student to the followed learning process. The student's response was obtained from a questionnaire distributed to the students of the experimental class at the end of the lesson. The result of questionnaire of student responses to the learning that had been implemented got a very good response to the implementation of guided inquiry learning flash-based invertebramedia.

Based on the analysis of the recapitulation, the obtained students' responses were included in very good category with a percentage of 84.93%, it meant that the effectiveness of learning process was not only seen from the success rate on the learning outcome but also from students' responses after the learning process.. Good learning can also make it easier for students to learn so that it takes a fun learning style, a good interaction between teachers and students combined with methods and learning models and materials in accordance with the needs and characteristics of students to impress students with learning that has been followed.

Teacher's response to the implementation of guided inquiry learning flash-based invertebramedia got good and positive response. The teacher responded that by applying guided inquiry learning flash-based invertebramedia, students become more motivated to show their ability in teaching and learning activities. As a consequence, student learning outcomes were increased. Teachers also impressed on the learning activity and were interested in applying this method to other materials. In this lesson besides students understood the materials, students were also braver to express their opinions in front of the class. The constraints that occurred in the application of this lesson was the lack of specimen due to limited time.

CONCLUSSION

Based on the research results and discussion presented before, it can be concluded that the implementation of guided inquiry learning by using Flash-based Invertebramedia affects the students' learning outcomes and can increase the students' activity.

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