USEJ 7 (2) (2018)

Unnes Science Education Journal

http://journal.unnes.ac.id/sju/index.php/usej

THE INFLUENCE OF GUIDED INQUIRY LEARNING ASSISTED FLASH APPLICATION ON ELECTROLYTE SOLUTION MATERIALS AGAINST THE RESULTS OF STUDENTS

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Article Info

Received March 2018
Accepted May 2018
Published July 2018

Keywords:
Guided Inquiry; Flash Application; Learning Outcomes

Abstract

This study aims to determine how much influence of guided inquiry learning assisted flash application on electrolyte solution materials to the results of student class X learning in SMA Negeri 8 Semarang. This research method using an experimental method. The sampling technique used cluster random sampling technique. Method of data collection was done with documentation to find out the population, questionnaire for student responses, test (pretest and posttest), and observation to assess aspects of affective and psychomotor learning outcomes. Hypothesis test used in this research is an analysis of influence between variables, a test of difference of two means, and coefficient of determination. The result of different test of two mean value of posttest t_{count} is 6.68 more than t_{table} 1.995 with dk = 70 and 5% significance level mean that experiment class learning result is higher than control class. Implementation of guided inquiry learning model with flash application contributes 64% of student learning outcomes. Display of flash application using Software Adobe Flash CS 6. Based on the results of research, can be concluded that guided inquiry learning assisted flash application has a positive effect on student learning outcomes in SMA Negeri 8 Semarang on the material of electrolyte and nonelectrolyte solution.

p-ISSN 2252-6617
e-ISSN 252-6232

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INTRODUCTION

Education is a process of interaction between teachers and students that encourage the learning process. The development of technology in the world of education is inseparable from the development in the field of science. In the process of learning in schools, science is often associated with subjects of Natural Sciences (IPA) (Dewi, et al., 2013). According to Hilman (2014) Natural Science (IPA) study aims to enable students to do scientific inquiry, improve knowledge, concepts, and science skills. One branch of science Science is the study of chemistry. Chemistry is a subject that studies the material and changes that occur in it. Chemical learning is very important in school and society because it is related to everyday life.

The initial observations were conducted at SMA Negeri 8 Semarang. The results of observation indicate that this school still use curriculum KTSP. Problems that occur is the students' understanding of the concept of chemistry learning materials is still low. This is indicated by the average value of mid-semester which is still below KKM (Criteria Completed Minimum) that is 75. Addition students consider that lessons in the classes less attention to freedom of thinking, a lot of rote, and impressed pursuing the curriculum. Learning done in SMA Negeri 8 Semarang tend to textbook oriented and teacher-centered so that less active learning. This is because classroom learning is dominated by teachers and has not emphasized the student-centered activities in concept building (Wardani, et al., 2016).

The problems that occur above indicate that the required model and learning media that can make students active in the learning process in SMA Negeri 8 Semarang (Ngertini, et al., 2013). One of the materials in the study of chemistry that requires a lot of explanation and supporting media in its achievement is the electrolyte and nonelectrolyte solution. Student learning outcomes in electrolyte solution materials can be improved by utilizing instructional media. According to Arsyad (2013) learning media can meet the three main functions of education that is motivating interest or action, provide information, and give instructions.

Wijaya's research, et al. (2017) states that the use of learning media can support the achievement of learning objectives and improve student learning outcomes. The use of media in the learning process is the very supportive achievement of learning objectives (Praptiwi, Sarwi, & Handayani, 2012). One of the right media to improve student learning result is flash media application. According Zubair (2015: 130-136) in line with the development of curriculum KTSP the use of flash application media is the implementation of audiovisual that utilize Information and Communication Technology (ICT) so as to improve the quality of education. The results of this study are in line with Rosadi, et al. (2015: 132-137) which states that the development of animated interactive learning based on flash can increase student's interest in learning electrolyte and nonelectrolyte solution along with appropriate learning model.

The learning model is one of the factors that affect the learning process. One of the learning models that can be used to improve student learning outcomes is guided inquiry model. According to Banerjee (2010: 1-2) guided inquiry model can change the focus of science education from memorizing concepts in subjects to learning through inquiry involving students actively using the process of science, critical and creative thinking skills such as finding answers to questions asked. As stated by Savitri, *et al.* (2017) inquiry learning used Green Learning Method (GeLeM) can improve student cognitive result and science process skill in science. learning Through this learning model is expected students can formulate their own inventions with full confidence so as to improve student learning outcomes in SMA Negeri 8 Semarang.

Based on the above problems, the purpose of this study are (1) to know the influence of guided inquiry learning model assisted flash application to student learning outcomes; and (2) to know the influence of guided inquiry learning model assisted by flash application to student learning result of subject of electrolyte solution in SMA Negeri 8 Semarang.

METHODS

This research uses experimental research conducted in SMA Negeri 8 Semarang. The experimental method was conducted with the intention to know the effect of a treatment (Arikunto, 2010). The population in this study is all the students of class X consisting of nine classes. The sampling technique using cluster random sampling technique is sampling in the form of groups that are done randomly with members of the

population who have the same homogeneity and the same variance. According Sugiyono (2012) sample is part of the number and characteristics possessed by the population. The sample of this research is XE class as experiment class and XF class as control class.

Implementation of the learning in the experimental and control classes was carried out for five meetings. Three meetings with learning activities in the classroom using guided inquiry model, one pretest meeting, and one posttest meeting. Research is continued by analyzing and processing the data that has been collected by the method specified. The results of the analysis are used to answer the hypothesis in the study and draw conclusions. This study uses Pretest-Posttest Control Group Design. The design of this research was taken by two groups chosen by random, then experimental class and control class were given pretest and posttest treatment. The design of this study is presented in Table 1.

Table 1. Treatment Experiment Class and Control Class

Group	Pretest	Treatment	Posttest
I	Y	X1	Y2
II	Y3	X2	Y4

Information :
Y1 = The pretest grade of the experiment class before being treated
Y2 = Posttest grade of the experimental class after being treated
Y3 = The pretest value of the control class before being treated
Y4 = Posttest value in the control class after being treated
X1 = Experimental treatment of guided inquiry-based model classes with flash applications
X2 = Treatment of controlled class of inquiry classes without flash application

Data collection method used in this research is documentation method. Documentation is used to obtain data on the student's list of population members, test method (pretest and posttest) to measure student's cognitive learning outcomes, observation method to find out psychomotor learning result on a practical process and affective aspect and questionnaire method to find out student's response to experiment class during the learning process.

This instrument research is a test in the form of a matter of pretest and posttest. The test instrument has been tested before it is used to determine the differentiation, validity, difficulty, and reliability. Instrument observation sheets and questionnaires have been validated by expert lecturers before use. The research implementation instrument consists of : Learning Implementation Plan (RPP), syllabus, Student Worksheet, a test of the cognitive test, affective aspect observation sheet, psychomotor aspect observation sheet, and student response questionnaire.

The technique of data analysis in this research is done in two stages, that is initial phase analysis and final phase analysis. Initial phase analysis is done by matching the sample consisting of normality test and homogeneity of population test. The final data analysis consists of normality test and equality test of two variances and hypothesis test. Hypothesis test consists of the test of difference of two means, a test of influence analysis between variable, and test of a coefficient of determination.

Descriptive analysis of data to know the learning outcomes of affective aspects and psychomotor aspects, and questionnaire responses of students to the learning process in the experimental class. End-stage data analysis is used to answer the hypothesis that has been proposed. The data used are pretest and posttest, affective and psychomotor learning result. Analysis of this data includes analysis of influence betweenkī variables, completeness test of learning result, the coefficient of determination, N-gain test, affective and psychomotor analysis, and student response questionnaire.

RESULTS AND DISCUSSION

The result of final data analysis showed the average of cognitive aspect test as presented in Table 2. Based on statistical analysis of posttest value on normality test using chi-square test obtained x^2count as 6.68 for experimental class and x^2count as 5.23 for the control class.

Table 2. Pretest-Posttest Value Data of Experiment and Control Classes

Source of Variance	Experiment Class		Control Class	
	Pretest	*Posttest*	*Pretest*	*Posttest*
Average	57.67	88.54	56.67	84.52
Variance	88.11	54.78	79.2	69.11
Highest Score	83	96	80	93
Lowest Score	36	70	40	60
Range	47	26	40	33
$\sum \geq 75$	3	33	2	31

The x^2 value obtained is smaller than x2table on degrees of freedom (dk) = 3 and the significant level (α) = 5% of 7.81, which means the data is normally distributed. The similarity test of two variances for pretest obtained F_{count} of 1.26 is smaller than F_{table} of 1.8 which means both classes have the same variance. Test the difference between two averages using the t-test formula. The results of normality test and similrity of two variances are presented in Table 3 and Table 4.

Table 3. Normality test

Class	Data	X^2count	X^2table	Criteria
Experiment	*Pretest*	4.99	7.81	Distributed normally
Control	*Pretest*	2.05	7.81	Distributed normally
Experiment	*Posttest*	6.68	7.81	Distributed normally
Control	*Posttest*	5.23	7.81	Distributed normally

Table 4. Results of Two Similarity Variance Test

Data	F_{hitung}	$F_{0.025}$	Criteria
Pretest	1.0101	1.7571	Both classes have the same variants
Posttest	1.2647	1.7571	Both classes have the same variants

Hypothesis test consists of the test of difference of two means, influence test between variable, and test of the coefficient of determination. The test results of a difference of two average Pretest-Postest value data are presented in Table 5.

Table 5. Test Results Difference Two-Point Data Value pretest postest

Class	Average	N	dk	tcount	ttable	Criteria
Pretest						
Experiment	57.13	36	70	1.914	1.995	Ho be accepted
Control	56.41	36				
Posttest						
Experiment	89.83	36	70	2.074	1.995	Ha be accepted
Control	87.58	36				

Table 6. Results of Descriptive Analysis of Affective Learning Results

No	Class	∑Score	Average	∑ Students with Criteria				∑Student
				Very good	Good	Enough	Less	
1	Experiment	1335.22	32.12	24	12	-	-	36
2	Control	1272.44	31.72	17	17	2	-	36

Table 7. Results of Descriptive Psychomotor Analysis

No.	Class	∑ Score	Average	∑ Students with Criteria				∑ Students
				Very good	Good	Enough	Less	
1.	Experiment	1156.33	32.12	28	8	-	-	36
2.	Control	1116.33	31.72	19	15	2	-	36

The learning in the experimental class and the control class is essentially the same as using the guided inquiry learning model. The difference in the class of experiments assisted flash applications while the control class is not assisted flash applications. The result of posttest value of students is obtained experimental class is 89.83 while control class is 87.58. Posttest data have then tested the difference of two average and obtained t-count equal to 2,074 bigger than t-table 1.995, because t-count is in rejection of Ho hence posttest value of experiment class is bigger than control class.

Increased cognitive learning outcomes can be expressed by the Normalized Gain Test (N-Gain Test) based on pretest and posttest values. The experimental class has increased with the high category (N-gain = 0.8) higher than the control class in the moderate category (N-gain = 0.6). Analysis of influence between variables expressed by biserial coefficient (rb). Posttest result data is then tested by biserial correlation so that got rb value equal to 0.798 with very high influence criterion. Price rb of 0.798 obtained the coefficient of determination of 64% so it can be concluded the influence of guided inquiry learning model assisted flash application by 64%. In addition to the consensus assessed appraisal is the affective domain.

Affective domain is a field that relates to the attitude and behavior of students during the learning process. The character values developed in this study are discipline, curiosity, honesty, responsibility, environmental care, and communicative. Descriptive analysis of affective learning data can be presented in Table 6.

According to Sönmez (2017: 347-356) descriptive analysis of data psychomotor learning results aims to determine the psychomotor value of students both experimental and control classes conducted at the time of practice. Things that are assessed on psychomotor assessments include preparatory activities, execution, and delivery of results. This is in line with Ural research (2016) which states that guided inquiry can be done with lab laboratory. In line with the opinion of Lisdiana (2015) to assess affective and psychomotor aspects in practicum activities can be done by observation method, in the form of checklist or random scale. Based on data analysis of psychomotor learning result presented in Table 7.

Students in experimental class 77.77% achieved psychomotor value with very good criteria and 22.22% students good criteria. Students in the control class as much as 52.77% achieved very good criteria, 41.67% students good criterion, and 5% student criteria enough. Descriptive analysis of student questionnaire was used to know the students' assessment of guided inquiry model based on a flash application in the experimental class. The results of questionnaire responses of students are presented in Figure 1.

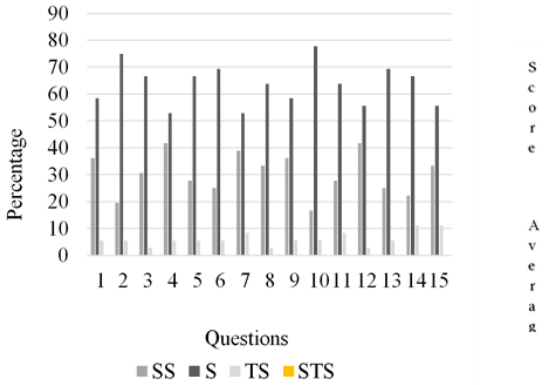

Figure 1. Result of Student Feedback Questionnaire

Based on the above exposure shows that guided inquiry learning assisted flash applications to provide higher achievements than without flash media applications. This is due to the flash application media can increase students 'motivation with a more attractive appearance and knowledge in accordance with the students' wishes about the material of electrolyte and nonelectrolyte solution with guided inquiry learning model. Inquiry learning is a learning based on constructivism means that students must construct their own knowledge with confidence (Jack, 2013). Students who can construct knowledge and solve problems through guided inquiry models will better understand the material being studied (Abdi, 2014: 37-41). The difference between the average of experimental class learning outcomes and control classes can be illustrated in Figure 2.

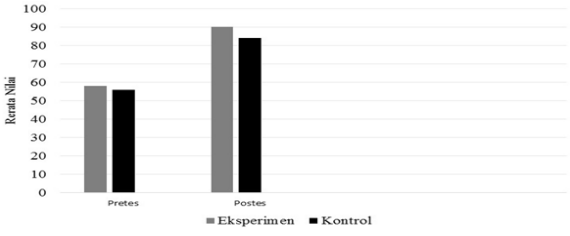

Figure 2. Student Cognitive Learning Analysis Results

The guided inquiry learning model consists of syntax, ie problems, hypotheses, designing experiments, conducting experiments, collecting and analyzing data, and drawing conclusions (Trianto, 2011). This learning model should be equipped with appropriate learning media. According to Kurniawati (2013: 149-155) the use of appropriate learning media can improve the efficiency, creativity, and quality of learning. One of the learning media that can improve student learning outcomes is the flash application media. The results of this study are in line with the research conducted Ditama, *et al*. (2015) which states that one of the programs that can be used to create flash applications is Adobe Flash CS 3. Software Adobe Flash CS 3 is a program designed specifically to create an interesting animation in order to facilitate students' understanding of a learning material. The interactive flash application is surely able to influence students positively for their learning achievement (Nurbaiti, *et al.,* 2017). The results of the research. Hutomo, *et al,.* (2016) mentions that flash media applications can increase student activity and understanding.

Based on the explanation above, it can be concluded that the implementation of guided inquiry learning model assisted by a flash application on electrolyte and nonelectrolyte materials have the positive effect on students' learning result, proved by the achievement of experimental class learning value higher than control class. The results of this study are in line with research conducted by Novilia et al (2016) which states that groups of students who are studying with guided inquiry models have higher cognitive learning outcomes than the student group with lecture methods. Research Wijayanti (2017) states that the application of guided inquiry instructional model assisted student worksheets can improve student learning outcomes. This study is also in line with research conducted by Aprillia, et al. (2015) stating that the development of inquiry-based flash media can improve student learning outcomes.

CONCLUSION

Based on data analysis and discussion of research results can be summarized as follows: (1) Guided inquiry learning assisted flash application gives a positive effect on student learning outcomes of class X on the subject matter of electrolyte and nonelectrolyte solution; (2) The influence of assisted inquiry model with flash application to cognitive learning outcomes of 64%; and (3) Improvement of affective and psychomotor learning result obtained from observation result through discussion and practicum activity. The results of affective and psychomotor learning in the experimental class in very high category and high category control category.

Some suggestions that can be submitted for further research, namely: (1) Development of guided inquiry learning model assisted flash applications can be developed on other chemicals; (2) Further research needs to be done to know the affectiveness and motivation of student learning by using guided inquiry learning model assisted by flash application that is produced in this research; and (3) Chemical instructional device with guided inquiry learning model assisted flash application must be well prepared and in accordance with learning materials of electrolyte and nonelectrolyte solution.

ACKNOWLEDGMENT

The author thank to Chemistry Education Postgraduate Universitas Negeri Semarang and SMA Negeri 8 Semarang.

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