AN ALTERNATIVE FOR SCHOOLS THAT DO NOT HAVE A LABORATORY: USE OF EXPERIMENTAL STUDENTS' WORKSHEET BASED CTL APPROACH BY UTILIZING THINGS IN EVERYDAY LIFE

Untung Desy Purnamasari

Ms, Yogyakarta State University, INDONESIA, untungdesypurnamasari.2017@student.uny.ac.id

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Abstract

Chemistry is a subject that until now difficult to understand, because many abstract chemistry learning concept. The chemistry lessons are closely related to the laboratory, so that the students can do experimental activities and can understand chemical theories easily. However, if the school does not have a laboratory, does not mean that students can not perform experimental activities such as students in other schools that have a laboratory. The solution of the problem is that teachers should be more creative to creating active and fun learning so that students can be interested and motivated to learn. The use of experimental students' worksheet based on CTL approach by utilizing the objects in our life is one alternative that can be done so that students can perform simple experimental activities. The purpose of this study is to determine the effect of the use of experimental students' worksheet based on CTL approach by utilizing objects in everyday life. This research used Pre-Experimental Design with one-group pretest-posttest design. The population in this study were students of grade XI science program in senior high school of Village Community Resilience Institute (LKMD) Laha with a sample of 18 students. school of Village Community Resilience Institute (LKMD) is a private high school so that only a small percentage of students are schooling here because every year there are students who do not pass the school exam. The results showed that the average of student learning outcomes was 76.6 and 18 students were able to achieve the minimum mastery criteria (KKM). Data analysis in this research used simple regression analysis with PASW statistics 18. Regression equation obtained is Y = 1,139x - 8,535 with correlation coefficient 0,986 and t = -2,362. The result of regression analysis shows that experimental students' worksheet based on CTL approach very influential on student learning outcomes and there are significant differences to pretest and posttest result, posttest was higher than pretest. Thus, Experimental students' worksheet based CTL approach by utilizing objectsin everyday life can be used as one of alternative for school that do not have laboratory.

Keywords: alternative, laboratory, chemistry learning, experimental students' worksheet, CTL approach

1. INTRODUCTION

Chemistry is one of the subjects that until now difficult to understand the concept and its application. According to a Royal Institude Chemistry study in the United Kingdom shows most students claim that chemistry is difficult (Anisa, et al., 2013: 16). Chemistry subjects are compulsory subjects for high school

students. The rate of reaction is one of the high school chemistry concepts in which there are sub-concepts that study the properties of particles that can not be observed by the eye (microscopic), such as molarity, and the factors that affect the rate of reaction. The concept of reaction rate is not enough if it is teached by the lecture method only because the students lack the learning experience, so that the students' concept understanding is less mature and the concept is easy to forget just like that resulted in low student achievement. The concept of reaction rate will be more easily understood if students observe the facts related to the concepts studied (Ifada, et al., 2012).

Based on observations and interviews with teacher of chemistry in senior high school LKMD Laha showed that students' learning outcomes, especially in the field of chemistry are low, and students can not do experiment activity because there is no laboratory. As a result, students only understand chemistry in theory. Though the concept of reaction rate requires proof of the theories obtained. In addition, the low student learning outcomes may be due to teachers being more dominant using lecture methods and less optimization of media usage leading to saturation in students and the lack of active participation of students in learning.

The solution of the problem is teachers should be more creative in creating active and enjoyable learning so that students can be interested and motivated to learn. The use of experimental students' worksheet based on CTL approach by utilizing the objects in our life is one alternative that can be done so that students can perform simple experimental activities. The purpose of this study is to determine the effect of the use of experimental students' worksheet based on CTL approach by utilizing objects in everyday life.

2. LITERATURE REVIEW

Learning is basically an interaction between teachers and students. The quality of the relationship between teachers and students in the learning process is largely determined by teachers in teaching and student in learning. So, if there is a positive relationship between teachers and students, students will be seriously included in this activity. The more involvement of students in this activity of course more possibility of students understand the concept of lessons are presented, and the other way. In other words, the quality of the relationship between teachers and students determines an effective learning process (Syaefudin, 2006: 3).

Generally, the implementation of learning involves three things: initial test (pre-test), learning process, and final test (post-test). The initial test (pre-test) is the beginning in the learning process that serves to prepare the students in the learning process, and to know the level of students' ability on the concept to be taught (Wenno, 2008: 52). While the final test (post-test) is an activity after the learning process implemented to see the success of learning by comparing the pre-test (Suryosubroto, 2009: 162).

Many approaches are used in the learning process, but most approaches are based on concepts solely without the students being equipped in solving problems with the capabilities they have in real life. Learning will be more meaningful if students experience what they learn, not knowing it. This is in line with Sagala's opinion: Contextual Teaching and Learning approach is a learning concept that helps teachers connect between concept taught to real-world situations of students and encourages students to make connections between their knowledge and application in their lives as family and community members (Sagala, 2003 : 87).

Johnson and Johnson (1999: 68) state that:

> "Contextual teaching and learning enables students to connect the content of academic subject with the immediate context of their daily lives to discover meaning. It enlarges their personal context furthermore, by providing students with fresh experience that stimulate the brain to make new connection and consequently, to discover new meaning."

This means that CTL allows students to connect academic content to the context of everyday life to find meaning.

According to Sund (1998: 341), experimental students' worksheet is a student activity sheet that contains instructions and questions that must be completed by students to find the concept and presented in the form of experimental activities. Experimental students' worksheet systematics generally consist of title, introduction, purpose, tools and materials, work procedures, observation columns, and questions. The benefits of experimental students' worksheet are as a guide for students in conducting learning activities, such as conducting experimental activities, as an observation sheet in which experimental students' worksheet provides and guides students to write observational data, and as a discovery sheet in which students express their findings in the form of new things that have never been he knew before.

Hypothesis proposed in this research are:

H_0: There is no effect of experimental LKS based on CTL approach to student learning outcomes

H_1: There is influence of experimental LKS based on CTL approach to student learning outcomes

3. RESEARCH METHODS

This research used pre-experimental design type. The research used one-group pretest-posttest design. The difference between the pretest and posttest scores is assumed to be the effect of learning. The advantage of using this design is that pretest provides a basis for seeing the effect of treatment on the achievement of the same subject before and after being subjected to experimental treatment (Suryabrata, 2005: 103).
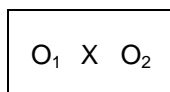
$$O_1 \quad X \quad O_2$$

Table 1. Research Design

Description:
O_1 : Initial test (pre-test)
X : Treatment using experimental students' worksheet based on CTL approach by utilizing objects in everyday life
O_2 : Final test (pots-test)

The population in this study were students of grade XI science of LKMD senir high school Laha. The sample in this study were 18 students. The instrument used in this research were a test instrument in the form of pretest and posttest, and non test instrument in the form of an observation sheet that measures the activities of teachers and students in the learning process.

4. RESULTS AND DISCUSSION

This study aims to determine the effect of the use of experimental students' worksheet based on CTL approach by utilizing objects in everyday life to improve students' learning motivation that impact on improving learning outcomes. This meeting was held for four meetings. The first meeting held initial test that aims to determine the initial knowledge of students on the concept to be taught. After the initial test, carried out the learning process of sub-concept of molarity. In this sub concept held a simple experiment using a glass of tea and sugar. The connection between sub-concepts of kemolaran based on experiments conducted with everyday life is when we make a glass of tea that tastes very sweet, we can add water to reduce the sweet taste of tea, this is called dilution.

The second meeting held a process of learning about the sub-concept of factors that affect the rate of reaction. In this sub concept held a simple experimental activity using egg shells and vinegar. The connection between the sub-concepts of factors that affect the rate of reaction based on experiments conducted by students with daily life is the egg shell containing calcium as well as our teeth. If we consume a lots of acidic foods or beverages then our teeth will be brittle soon, this proves the effect of concentration on reaction rate. In addition, experimental activities were conducted by dissolving vitacimin tablets using hot and cold water. Vitacimin tablets reacted with hot water dissolve faster than low temperatures, this proves the effect of temperature on reaction rate. Experimental activities were then carried out to prove the effect of surface area on reaction rate by dissolving fine salt crystals and crude salt crystals each into different containers that already contain water. This proves that the fine salt crystals dissolve faster than the coarse salt crystals.

The third meeting held a simple experimental activity using papaya leaf and fillet of meat. Students compare fillet of meat cooked with papaya leaves and without papaya leaves. Fillet of meat cooked with papaya leaves is faster than fillet of meat without papaya leaves because papaya leaves contain papain enzymes that can soften the meat. This proves the effect of the catalyst on the reaction rate. Furthermore, the process of learning about sub-concepts of catalyst role in living things. All of the learning process using experimental students' worksheet based on CTL approach.

Fourth meeting held the final test to know the influence of experimental students' worksheet based on CTL approach to student learning motivation. Based on the results of research that has been done, obtained initial test results as follows:

Value	Frequency	Relative Frequency (%)	Qualification
90 – 100	-	-	-
80 – 89	-	-	-
70 – 79	-	-	-
< 70	18	100%	Less / fail
Total	18	100%	

Table 2. The values of initial test

Initial test results indicate that all students are in less or failing qualifications. This is because the concept of reaction rate prepared in the form of preliminary test questions has not been taught and students are not prepared to follow the lesson, so the students are unable to answer the questions. In addition, most students are not able to answer the indicator about calculating the volume of solution to be added to make the solution at a certain concentration.

Furthermore, from learning process using experimental students' worksheet based on CTL approach obtained data as follows.

Qualification	Number of students	Relative Frequency (%)
Very good	5	83,3
Good	13	16,7
Less / fail	-	-
Total	18	100%

Table 3. The value of students' worksheet

Based on the data, it is found that there are 5 students (83,3%) with very good qualification, 13 students (16,7%) with good qualification, and there are no less / unsuccessful students.

The final test is given to the students after the learning process is done to determine the students' learning motivation on the concepts taught using experimental students' worksheet based on CTL approach that impact on the increase of student learning outcomes. The final test result of students can be seen in the following table:

Value	Frequency	Relative Frequency (%)	Qualification
80 – 89	5	27,8%	Good
70 – 79	13	72,2%	Enough
Total	18	100%	

Table 4. The value of final test

Based on the data in table 4 shows 5 students (27.8%) with good qualifications and 13 students (72.2%) with sufficient qualifications. After learning by using using experimental students' worksheet based on CTL approach, then at the fourth meeting students are given a final test (posttest) to determine student learning outcomes on the concept of reaction rate. The final test results indicate that the value obtained by students was upper of KKM (> 70). This shows that learning using using experimental students' worksheet based on CTL approach can improve student learning outcomes.

Regression method is used to see the effect of dependent variable (bound) to independent variable (free). Since the regression output is large enough, then the regression analysis results will be discussed one by one.

Descriptive Statistics

	Mean	Std. Deviation	N
T. Akhir	76,5556	5,83319	18
LKS	74,7222	5,05040	18

Tabel 5. Descriptive Statistics

Correlations

		T.Akhir	LKS
Pearson Correlation	T.Akhir	1,000	,986
	LKS	,986	1,000
Sig. (1-tailed)	T. Akhir	.	,000
	LKS	,000	.
N	T. Akhir	18	18
	LKS	18	18

Table 6. Correlations

Analysis:

a. The average test result of the study with the number of students 18 people is 76,5556 with standard deviation 5,83319.

b. The average value of using experimental students' worksheet based on CTL approach with the number of students of 18 people is 74.7222 with a standard deviation of 5.05040.

c. The relationship between using experimental students' worksheet based on CTL approach calculated by correlation coefficient was 0.986. This suggests a very close relationship (close to 1) between the using experimental students' worksheet based on CTL approach and the learning result test.

d. A significant level of one-sided correlation coefficient of output (measured from sig 1 tailed) yields a 0.000 number which means the correlation between using experimental students' worksheet based on CTL approach and student learning result test is very real.

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	LKS[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: T. Akhir

Tabel 7. Variables Entered

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,986[a]	,972	,970	1,00472

a. Predictors: (Constant), LKS
b. Dependent Variable: T. Akhir

Tabel 8. R square number

Analysis:

a. The first table shows the variables included are LKS and no variables are removed. This is because the method used is single step (enter) and not stepwise.

b. The R square number is 0.972. R square ranges from 0 to 1, with the bigger the number R square, the closer the relationship between two variables.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	562,293	1	562,293	557,021	,000[a]
	Residual	16,151	16	1,009		
	Total	578,444	17			

a. Predictors: (Constant), LKS

b. Dependent Variable: T.Akhir

Table 9. F-test (ANOVA)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8,535	3,613		-2,362	,031
	LKS	1,139	,048	,986	23,601	,000

a. Dependent Variable: T.Akhir

Table 10. t-test

Analysis:

a. From ANOVA or F test, the value of 557,021 with significant level 0.000. The significant level of 0.000 <0.05 then H0 is rejected and H1 is accepted.

b. The next table shows t test obtained value 23,601 with significant level 0.000. The significant level of 0.000 <0.05 then H0 is rejected and H1 is accepted. In other words, significant regression coefficients or experimental students' worksheet based on CTL approach really have a significant effect on students' learning outcomes on the concept of reaction rate.
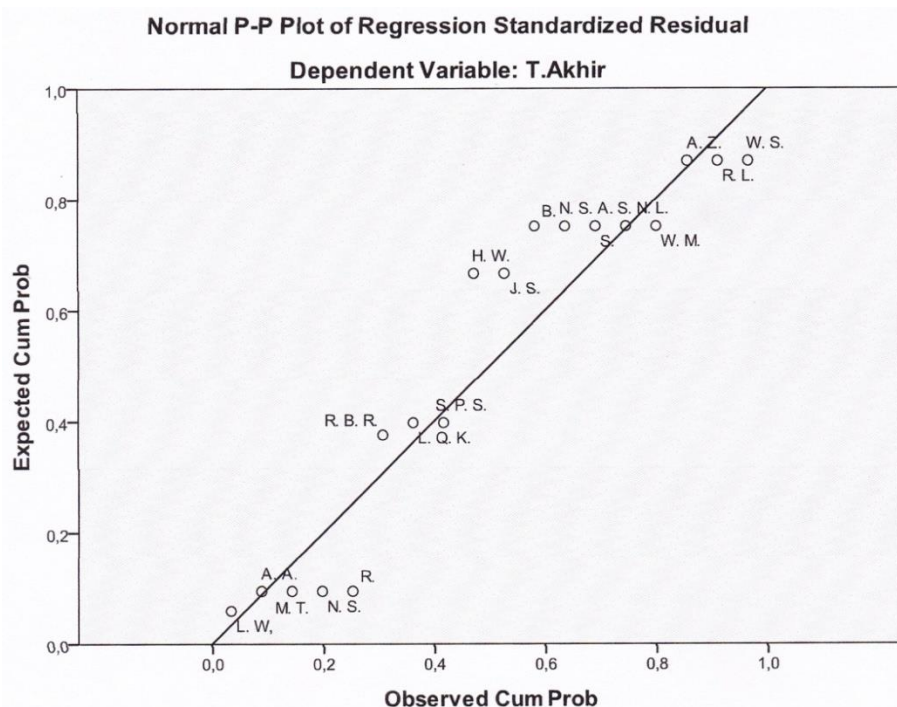

Table 11. Normal P-P Plot of Regression Standarized Residual

Analysis:

Distribution of data on the charts spread around a straight line, it can be said that the normality requirements can be complete.

Based on the results of regression, it can be said that both of variables are closely related. Based on the statistical hypothesis H_0 rejected and H_1 accepted which means that there is influence of experimental students' worksheet based on CTL approach to student learning outcomes

5. CONCLUSION

Based on the results of the study showed that the average of student learning outcomes was 76.6 and 18 students were able to achieve the minimum mastery criteria (KKM). Data analysis in this research used simple regression analysis with PASW statistics 18. Regression equation obtained is $Y = 1,139x - 8,535$ with correlation coefficient 0,986 and $t = -2,362$. The result of regression analysis showed that experimental students' worksheet based on CTL approach very influential on student learning outcomes and there were significant differences to pretest and posttest result, posttest was higher than pretest.

6. ACKNOWLEDGEMENT

REFERENCE LIST

Anisa, D. N., Masykuri, M., and Yamtimah, S. (2013). *Pengaruh Model Pembelajaran POE (Predict, Observe, and Explanation) dan Sikap Ilmiah Terhadap Prestasi Belajar Siswa Pada Materi Asam, Basa, dan Garam Kelas VII Semester 1 SMP N 1 Jaten Tahun Pelajaran 2012/2013*. Jurnal Pendidikan Kimia, vol. 2 (2). hal. 16-23. https://media.neliti.com/media/publications/121013-ID-none.pdf.

Ifada, F., Mulyani, B., and Saputro, A. N. C. (2012). *Studi Komparasi Pembelajaran Metode TAI (Team Assistes Individualized) yang Didukung Kegiatan Laboratorium dan VBL (Video Based Laboratory) Terhadap Prestasi Belajar Siswa Pada Materi Sub Pokok Bahasan Faktor-Faktor yang Mempengaruhi Laju Reaksi Kelas XI Semester Ganjil SMA Negeri 2 Kudus Tahun Ajaran 2011/2012*. Jurnal Pendidikan Kimia, vol. 1 (1). hal. 44-50. http://jurnal.fkip.uns.ac.id/index.php/kimia/article/download/281/342.

Johnson, D. W., and Johnson, R. T. (1999). *Theory Into Practice: Making Cooperative Learning Work*, vol. 38 (2). hal. 67-73. http://www.jstor.org/stable/1477225.

Sagala, S. H. (2003). *Konsep dan Makna Pembelajaran*. Bandung: Alfa Beta.

Sund, R. (1998). *Teaching Science Through Discovery*. New York: Macmilan Publishing Company.

Suryasubrata, S. (2005). Metodologi Penelitian. Jakarta: Raja Grafindo Persada.

Suryosubroto, B. (2009). Proses Belajar Mengajar di Sekolah. Wawasan Baru Beberapa Metode Pendukung dan Beberapa Komponen Layanan Khusus. Jakarta: Rineka Cipta.

Syaefudin, U. (2006). Pembelajaran Terpadu. Bandung: UPI Press.

Wenno, I. H. (2008). Strategi Belajar Mengajar Sains. Sari Kuliah. Yogyakarta: Grafika Indah.