ATLANTIS PRESS
Advances in Social Science, Education and Humanities Research, volume 174
First Indonesian Communication Forum of Teacher Training and Education Faculty Leaders International Conference on Education 2017 (ICE 2017)

The Using of Peer Tutoring Learning Method in Improving Student's Understanding

Friska Septiani Silitonga
Chemistry Education Department
FKIP, Universitas Maritim Raja Ali Haji
Tanjungpinang, Kepulauan Riau-Indonesia
friska.septiani89@gmail.com

***Abstract*—The aimed of this research was to determine the significant influence of peer tutoring learning method to increase student interest and learning outcomes on environmental chemistry material. This study was conducted to determine the effect of peer tutoring learning method on environmental chemistry and described the learning interest student in followed the lecture. The research was a quasi experiment by taking a saturated sample of chemistry education department students accounted for 50 students. In this study used non-equivalent control group design. The technique of collecting data used test instrument and questionnaire. Based on data analyze obtained from the average score pre-test in the experimental class at 47.80 and post-test at 83.80. Pre-test score of control class was 55.60 and the post-test score was 77. Hypothesis analysis was done by using t-test two parties with α=0,05 and obtained t-cal was 3.623 and t_{-tab} 1.672, therefore was t-cal > t_{-tab} that Ho rejected and Ha accepted, it can be concluded that peer tutoring learning method can improved student results in environmental chemistry material with learning outcomes improved was 76.3 percent. Pearson's correlation test was also conducted to see the relation between interest and student learning outcomes and obtained correlation number was 0.537>0.05 with sig.(2-tailed) were 0.006, so it can be concluded that there was a relationship between interest and student learning outcomes. Student mastery learning value with the KKM≥ 80 was 76 percent, so by developed peer tutoring learning method was able to activate students in the learning process.**

Keywords—Peer tutoring, learning outcomes, learning interest.

I. INTRODUCTION

Environmental chemistry is the science what discussed the environment or nature, both of ecosystem, biogeochemical cycle, water, soil, air and discussed the water pollution, soil pollution, and air pollution. An environmental chemical material also discussed twelve principles of green chemistry towards sustainability life, dangerous chemicals and toxic, and environmental toxicology. During the time, students tend to memorize the material without understanding this material, therefore less meaningful conducted in environmental chemistry class. Students have a tendency to get bored, slept in coursework. Therefore, chemistry was still classified as the science have been more difficult to be understood by the students[1]as a prospective educators or learner. Therefore, lectures were able to provide motivation and introduced environmental chemical material with more attractive and been friendly with attention to the surrounding environment.

According to [2], to achieve the good learning goal so the lesson should be student center learning, where learning center for students and lectures as a facilitator. To enhance students understanding and explain between environmental chemicals studied with the surrounding environment can be used an approach the peer tutoring. Peer tutoring [3]was an approach in which students take turns in the role of a teacher in their group [3]. Through this approach, students would be more happy to explain their opinion in the group. Learning with peer tutoring approach, students selected as tutors are students who have been a greater ability than the other students in the group were willing to train and coached friends in the group[4]. Peer tutoring approach is characterized by mutual helping between the tutor with tutee in learning [5].

Peer tutoring can increase student learning outcomes by improving the understanding of students with mastery of concept [6]. The more effectivity role of a tutor in the group, it can improve student mastery of concepts, so that the students were able to understand the inter-relation between environmental chemical with the environment. Implementation of peer tutors learning approach can improve student participation in learning [7]. According to [8], peer tutoring was a method in which one of the students became tutors from other members in the group. There are six strategies that need to be considered in the implementation of peer tutors[8], that:

- Defining and planning a peer tutoring program
- Training peer tutors
- Monitoring daily results
- Assessing peer tutoring
- Finding support for peer tutoring
- Sustaining a peer tutoring program.

One of the advantages of the peer tutoring method was appropriate students will be assisted in its shortcomings, a weak student can tell the tutor did not yet understand. Implementation of peer tutoring methods and mind mapping was expected to increase the activity and understanding of the students in the learning process. The difference of the research such as Nurdin research (2012) that was an early concept of students. Nurdin research accentuated on self-efficacy, but in this research accentuated of early concepts of students.

II. METHOD

This research was conducted in Chemistry Education Department FKIP Universitas Maritim Raja Ali Haji. The research was conducted from September 2016-October 2016. Population in the research was a student of Chemistry Education Department FKIP Universitas Maritim Raja Ali Haji totaled 50 students consisted of 2 classes and the population was directly became sampling in this research with the technique of determining the number of samples by sampling saturated. The research was a quasi-experimental involved a experimental and control groups.

Research design used a nonequivalent control group design because there were two groups were experimental and control group. Assessment conducted was before and after the treatment using peer tutor methods with mind mapping. Peer tutoring method measured by differences results of pre-test and post-test. Research design by using peer tutoring methods shown in Table I.

TABLE I. NONEQUIVALENT CONTROL GROUP DESIGN

Group	Pretest	Treatment	Posttest
EG	O	X	O
CG	O	-	O

EG : Experimental Group
CG : Control Groups
X : Learning by peer tutoring with mind mapping
O : Pre-test and post-test

O was the results of the pre-test before students were given treatment, while X in experimental groups that was performed by using the peer tutoring methods and post-test results after the students were given the treatment by using the peer tutoring methods.

Procedures scheme was conducted in the research was determined population. The population in the research was students of Chemistry Education Department FKIP Universitas Maritim Raja Ali Haji totaled 50 students and consisted of two classes. Both of them was used as experimental and control groups. The experimental and control group were given a pre-test to determine the results of the students before being given the treatment. After being given a pre-test, then the experimental group was given treatment used peer tutoring methods and control groups used conventional methods. Then, experimental and control group was given post-test to determine the test results after being given treatment peer tutoring methods. Then, the data were analyzed and tested the hypothesis, then deduced.

Data collection techniques used in this research was a test to measure student learning outcomes by using pre-test and post-test. In addition, in this research was also conducted measurement of students learning interest used peer tutoring methods by given questionnaires interest.

Data analysis was tested by t-test two partied to prove the hypothesis as follows:

Ho: $\mu 1=\mu 2$: There is no significant effect of learning outcomes of environmental chemicals by used peer tutoring methods.

Ha: $\mu 1\neq\mu 2$: There is a significant effect of learning outcomes of environmental chemicals by used peer tutoring methods.

Normality data test were analyzed by using Kolmogorov-Smirnov (KS-21) and then after that, homogeneity test was conducted. After the data obtained normal distribution and homogenous, then followed by hypothesis tested by using t-test two parties with the significance of 0.05, and analysis was performed using SPSS-22 version.

III. RESULTS AND DISCUSSION

A. *Average Student Results*

From the data analyzed, obtained the difference between the average results of pre-test and post-test from experimental and control groups. The average results for experimental and control group were 47.80 and 55.60 with 25 students for each group. Experimental groups given treatment by using peer tutoring methods, while control groups by using discussion and lecture methods. Then, experimental and control groups given a post-test with the average results for experimental groups were 83.80 and for control groups were 77, shown in Table II.

The experimental group was given a treatment by using peer tutoring methods. The tutor was selected based on students academic achievement, then tutor taught by lecturers so that the tutor can teach tutee in the learning process and lecturers acted as facilitators to increase student interest [9]. Increased understanding of students in the experimental group caused by peer tutoring used a more familiar language with friends who in the tutee. A fun and relaxed learning atmosphere can eliminate a fear, easily for understanding concepts, and attracted students interest in learning [10].

TABLE II. AVERAGE PRE-TEST AND POST-TEST RESULTS

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pretest experiment	25	25	35	60	47.80	7.649
Postest experiment	25	20	75	95	83.80	6.964
Pretest control	25	20	45	65	55.60	6.819
Posttest control	25	20	65	85	77.00	6.292
Valid N (listwise)	25					

B. *Normality and Homogeneity Test Results*

Normality test was analyzed by using SPSS-22 version and to determine the normality of pre-test data for experimental and control groups in the environmental chemicals learning process shown in Table III. Normality analysis results of students result from pre-test on environmental chemicals with the significance of 5% (α=0.05) followed the Kolmogorov-Smirnov (KS-21) and obtained that Sig. result of the experimental group was 0.200>0.05 so that the data obtained a

normal distribution. Control group get Sig results for 0.186>0.05 so that the data obtained was a normal distribution.

TABLE III. NORMALITY TEST OF PRE-TEST RESULTS

factor		Kolmogorov-Smirnov[a]			Distribution
		Statistic	*df*	*Sig*	
pretest	Exp	0.133	25	0.200*	Normal
	control	0.145	25	0.186	Normal

The test homogeneity analysis was conducted after normally distributed data was obtained. Based on the pre-test results on the experimental and control group obtained homogeneity results shown in Table IV. In Table IV conducted results of pre-test results of experimental and control based on Levene statistic was homogenous with Sig 0.501>0.05 so it can be stated that pre-test results of experimental and control groups came from the same variant or homogenous.

TABLE IV. HOMOGENEITY TEST OF PRE-TEST RESULTS

Levene Statistic	df1	df2	Sig.
0.460	1	48	0.501

Normality test was also conducted on the post-test results of experimental and control group. Normality analysis of post-test results on environmental chemical material with a significance 5% (α=0,05) was followed Kolmogorov-Smirnov (KS-21) and sig results for the experimental group was0.142>0.05 and can otherwise that data was a normal distribution. The control group gained Sig. result 0.084>0.05, therefore it can be said that was normal distribution shown in Table V.

TABLE V. NORMALITY TEST OF POST-TEST RESULTS

factor		Kolmogorov-Smirnov[a]			Distribution
		Statistic	*df*	*Sig*	
posttest	Exp	0.152	25	0.142	Normal
	control	0.163	25	0.084	Normal

After it was found that the data were normally distributed of post-test results and then proceed with the analysis of homogeneity test. Based on the post-test results on the experimental and control groups obtained the results shown in Table VI. The Table VI showed that the data of post-test results for experimental and control groups were homogenous shown of Sig. Levene statistic was 0.643>0.05. So it can be said that the data of post-test for experimental and control group derived from the same variance or homogenous.

TABLE VI. HOMOGENEITY TEST OF POST-TEST RESULTS

Levene Statistic	df1	df2	Sig.
0.218	1	48	0.643

C. Results of Hypothesis Tested

After the data are known as normal and homogenous, proceed to test the hypothesis with t-test two partied whether there were influence learning outcomes by using peer tutoring methods. T-test of experimental and control groups shown in Table VII. Table VII shows the results of the t-test for post-test data of experimental and control group had t_{-cal} was 3.623 with df=48. The results compared to t_{-tab} was 1.6772 with significance 5% and df=48. It indicated that the results of t_{-cal} greater of t_{tab}(t_{-cal}: 3,623> t_{-tab}: 1,6772). It can be concluded that the peer tutoring methods can be an effect of student results. It can be concluded that the experimental groups by using peer tutoring methods had better learning outcomes than the control group without using peer tutoring methods.

TABLE VII. HYPOTHESIS TESTED

	Levene's Test for Equality of Variances				
	F	*Sig.*	*t*	*df*	*Sig-(2-tailed)*
posttest	0.218	0.643	3.623	48	0.001

Based on the analysis results obtained, it can be concluded that learning with peer tutoring methods has significant influences on student learning outcomes. Using the peer tutoring methods encouraged students to be more active in learning processed and being able to explain their opinion in the group [11].

D. Correlation analysis of interest to the learning outcomes by using peer tutoring methods.

Further analyzed the correlation between interest in learning to learning outcomes using a questionnaire with 20 expressions of learning interest (Likert scale) with 5 choice (1,2,3,4,5). Grating interest learning questionnaire distributed to students can be seen in Tabel VIII.

TABLE VIII. QUESTION OF QUESTIONNAIRE IN INTEREST LEARNING

No.	Condition	Item Questionnaire interest	
		Positive statements	*Negative statements*
1.	(*Attention*)	1, 9, 14, 16, 18	2, 6, 13
2.	(Relevance)	3, 15	5
3.	(Confidence)	7	19
4.	(Satisfaction)	4, 8, 10, 11, 12, 20	17

Correlation between learning interest to learning outcomes by using peer tutoring methods provide results Sig Pearson 0.006<0.05 that indicated that there was a correlation between learning interest and learning outcomes. The correlation between learning interest and learning outcomes generated 0.537** (Table IX), this suggested that the higher the learning interest of students then study results also increased. Learning by using peer tutoring methods was able of activating students in groups to express their opinion and being able to improve students learning outcomes [12].

TABLE IX. CORRELATION BETWEEN LEARNING OUTCOMES AND LEARNING INTEREST

		Learning outcomes	Learning interest
Learning outcomes	Pearson Correlation	1	,537**
	Sig. (2-tailed)		,006
	N	25	25
Learning interest	Pearson Correlation	,537**	1
	Sig. (2-tailed)	,006	
	N	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

Then calculate the percentage of completeness was also learning outcomes of students by using peer tutoring methods. Mastery learning gained from KKM, for learning set at ≥ 80 passed. So that the students result obtained from the percentage of completeness learning outcomes of students by 76%.

The results of pre-test and post indicated that student learning outcomes have increased by using peer tutoring method. Average students learning outcomes increased from 60 of pretest and 95 of post-test results. This was accorded with the [6] statement that was through the peer tutoring method can enable students in learning. Pee tutoring method also made the students more activated, opened, creative, been diligent doing the task given, this was accordance with the statement of [7].

IV. CONCLUSION

Learning by using peer tutoring methods have managed to improve students understanding of environmental chemicals. Tutee was more relaxed in issuing opinions to the tutor in their groups. Peer tutoring methods were expected to be the solution for a fun learning. Learning by using peer tutoring methods was able to activate students in the group. Mastery learning outcomes of students by using peer tutoring methods of 76%.

REFERENCES

[1] H. Nurdin, "Penerapan Metode Tutor Sebaya pada Mata Pelajaran Kimia untuk Meningkatkan Self-Efficacy Siswa Keals XII Pertanian SMKLN 1 Watang Pulu Sidrap," J. Chem., vol. 13, no. 2, pp. 17–25, 2012.

[2] E. Mulyasa, Kurikulum Tingkat Satuan Pendidikan. Bandung: PT. Remaja Rosdakarya, 2010.

[3] Nancy Falchikov, Learning Together Peer Tutoring in Higher Education. London: Routledge Falmer, 2001.

[4] R. Sari and S. Aisyah, "Penerapan Peer Instruction With Structured Inquiry (Pisi) Untuk Meningkatkan Hasil Belajar Kimia Siswa,"EduChem, vol. 1, no. 2, pp. 176–188, 2016.

[5] Keith Tooping, The Peer Tutoring Handbook: Promoting Co-Operative Learning. Cambridge: Brookline Books, 1988.

[6] M. Saumi and K. W. Anom, "Peningkatan Hasil Belajar Kimia Melalui Peran Tutor Sebaya Siswa Kelas X . A SMA."J. Pen.Pend.Kim, vol1, no 1, pp.43-50, 2014.

[7] Jusniar, "Pengaruh Penggunaan Tutor Sebaya Terhadap Hasil Belajar Kimia Siswa Kelas X SMAN 1 Bajeng," J. Chem., vol. 10, pp. 36–43, 2009.

[8] Edward Gordon, Peer Tutoring A Teacher's Resource Guide. USA: Scarecrow Education, 2005.

[9] N. Fadhilah, Haryono, S.B. Utomo, "Penerapan Model Pembelajaran Peer Tutoring Dilengkapi Tahu dan Prestasi Belajar Kimia Pada Materi Pokok Hidrokarbon Siswa Kelas X-6 Sma N 3 Boyolali,"J. Pendidikan Kimia, vol. 2, no. 4, pp. 51–57, 2013.

[10] E. E. Fetko, B. C. Collins, K. D. Hager, and A. D. Spriggs, "Embedding Science Facts in Leisure Skill Instruction Conducted by Peer Tutors," vol. 48, no. September, pp. 400–411, 2013.

[11] N. S. Indrianie, "Penerapan Model Tutor Sebaya pada Mata Pelajaran Bahasa Inggris Reported Speech terhadap Hasil Belajar Peserta didik," J. Kebijakan dan Pengembangan Pendidikan,vol. 1, no.1, pp. 126–132, 2015.

[12] R. Arjanggi and T. Suprihatin, "Metode Pembelajaran Tutor Teman Sebaya Meningkatkan Hasil Belajar Berdasar Regulasi-Diri," J. Makara, Sos. Hum., vol. 14, no. 2, pp. 91–97, 2010.