

The influence of the LSLC-based GIL learning model on the material of electrolysis cells on the learning outcomes of class XII students of SMA N 5 Padang

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ABSTRACT

This research is motivated by the not optimal learning model used by educators. To overcome this problem, a Lesson Study for Learning Community (LSLC) is implemented, there are 3 stages (Plan, Do and See) in one cycle. The role of the observer in the LSLC will have an impact on increasing the competence of educators, which will affect the learning process and increase student learning outcomes. The purpose of the study was to determine the effect of the LSLC-based Guided Inquiry Learning Model on the Electrolysis Cell material on the learning outcomes of class XII students of SMA N 5 Padang. The type of research is Quasi Experiment with Pretest-Posttest Control Group Design. The study population was class XII students of SMA N 5 Padang and samples of class XII MIPA 1 and XII MIPA 3. Data were analyzed using the N-gain test, normality test, homogeneity test, and hypothesis testing (t-test). Based on the results of the study, the influence of the LSLC-based Guided Inquiry Learning (GIL) learning model, the results of the N-gain value analysis ($g = 0.63$) stated that the LSLC-based GIL learning model had moderate criteria. This shows that the LSLC-based GIL learning model is effective in improving student learning outcomes. This is evidenced by the increase in learning outcomes by 32.97%, the sample data is normally distributed, the two research samples are homogeneous, the hypothesis test is obtained t_{count} (2.04) and t_{table} (1.994), it can be concluded that H_0 is rejected because t_{count} is greater than t_{table} .

1. Introduction

21st century skills can provide the necessary resources. By having 21st century skills or 4C skills, the required HR criteria will be better (Trilling & Fadel, 2009), to realize 21st century skills, an effective learning model is needed. An effective learning model is a learning process that emphasizes the process of acquiring knowledge or learning based on constructivism and connecting knowledge with real experiences in everyday life (Hanson, 2006; Barthlow & Watson, 2014).

Inquiry learning model is one of the learning models that can be used in learning. By using this guided inquiry learning model students are required to be active in improving the ability to think logically, critically and systematically so that students are able to find concepts independently



through the questions asked, on the other hand educators facilitate students to learn (Andromeda et al. 2021; Asda & Andromeda, 2021). According to Hanson (2006) GIL consists of 5 stages, namely orientation, exploration, concept formation, application and closing.

Before applying the GIL model, what needs to be done is to increase the competence of the educators themselves. Efforts that can be made to improve the competence of these educators are by implementing Lesson Study (LS). Lesson Study is an approach to improving the quality of learning and professional development of educators (Susilo, 2009). To implement the LS, a learning community was formed. A learning community is a group of people who carry out the exchange of common values or beliefs to agree to actively study with one another (Saito et al. 2014). Lesson Study for Learning Community (LSLC) is an activity of fostering the teaching profession by studying collaborative and continuous learning, based on the principles of togetherness and interrelationships in a study group or community (Sudirtha, 2017). LSLC is also able to increase the degree of student-centered pedagogical (Vermunt et al. 2019). LSLC in the form of observation by a group of teachers in the classroom (Lewis et. 2006). In LSLC there are 3 stages in one lesson, the first stage is plan, the second is do and the third stage is see or reflection (Sudirtha, 2017).

Based on the results of interviews conducted during the program educational field experience (PPLK) at SMAN 5 Padang in chemistry subjects, the authors found that the learning process was not carried out optimally due to the lack of preparation of educators in teaching. The learning process is more often focused on educators because the learning process which still often uses conventional methods makes students bored when receiving lessons. The lack of motivation of students in participating in the learning process causes students to often not focus in the chemistry learning process. This can have an effect on student learning outcomes. Based on data on Chemistry Grades for Class XII SMA N 5 Padang Odd Semesters for the 2020/2021 Academic Year, it can be concluded that 72.22% of students have scores below the KKM. From the learning outcomes, educators get information on how far students understand the material. Based on the table of student scores, it can be concluded that many students have low scores or do not understand chemistry, especially electrolysis cells.

From the research results that have been reported, it is found that this material is considered difficult by students. The inability of students to think critically causes difficulties and misconceptions occur in the material of electrolysis cells (Yudha et al. 2021). As well as the inability of students to relate macroscopic, microscopic and symbolic phenomena it can also cause students conceptual understanding to be incomplete, resulting in conceptual errors (Gabel et al. 1987; Schafer et al. 2021; Nasution et al. 2018).

From the description above, the GIL learning model can be applied in conjunction with LSLC to improve the quality of educators so that it will have an impact on improving learning outcomes in electrolysis cell material, the LSLC-based GIL learning model is able to make GIL learning more effective so that it will have an impact on improving student learning outcomes. Where in the learning process, students are able to build concepts independently with the implementation stage given by the educator as a facilitator and seen from the LSLC it self. LSLC can be used as a means of improving the professionalism of educators, there is collaboration between several educators where plan, do, and see activities are carried out for the implementation of learning, in order to realize better and effective learning to improve student learning outcomes.

2. Methods

This research uses a quasi-experimental type of research (quasi-experimental). According to Sugiyono (2017), quasi-experimental design has a control group but cannot fully function in regulating external variables that can interfere with experimental activities. In this study, it will be seen the

effect of the treatment given, namely the guided inquiry learning model based on lesson study for learning community on student learning outcomes. The design of this study used a pretest-posttest control group design (Table 1). The population in this study were students of class XII SMA N 5 Padang, totaling 6 classes, and the samples in this study were class XII MIPA 1 as the experimental class and class XII MIPA 3 as the control class.

Table 1. Research Design Nonequivalent Control Group Design

Class	Pretest	Treatment	Posttest
Experiment	X_1	Y	Z_2
Control	X_3		Z_4

The sample selection technique used is random sampling. Variable in there are 3 types of this research, namely the independent variable (guided inquiry learning model based on lesson study for learning community), the dependent variable (student learning outcomes), and the control variable (allocation of time and learning materials). Data is the result of recording research on the object under study in the form of numbers or facts that are used as the basis for compiling information in testing the truth of research hypotheses (Arikunto, 2012). The data obtained are primary data types, namely student pretest-posttest score data. According to (Saifudin, 2018) primary data is data collected from data sources directly. The data collection instrument used by the researcher was a test in the form of pretest-posttest questions.

The questions that are used as pretest-posttest questions have been validated first question item. Latisma (2011) states, the item is declared valid if the parts of the item in the question have a score that matches the direction of the total score or has a positive relationship. This validity test uses the biserial point correlation coefficient formula, the reliability test uses the KR formula. 20, difficulty index (P) and discriminating power (D).

The data analysis technique of the pretest-posttest results carried out was the N-gain test, the test normality using the Kolmogorov-Smirnov test, homogeneity test with the F test, and hypothesis testing with the two-mean difference test (t-test).

3. Results and Discussion

After carrying out learning in the experimental class and control class, there was an increase in the average learning outcomes of chemistry in both classes. For more details can be seen in Figure 1. The data obtained were tested for the N-Gain value to determine the increase in learning outcomes that occurred (Hake, 1998). The obtained N-Gain data can be seen in Table 2.

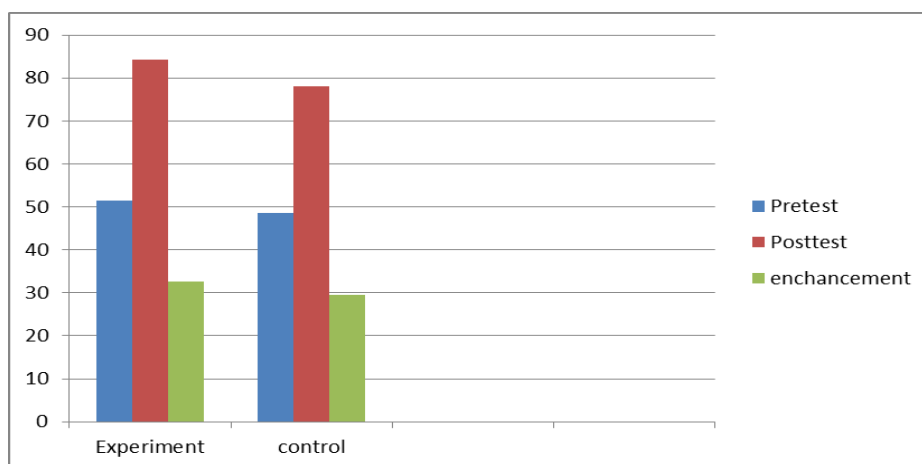


Figure 1. Average learning outcomes for the control class and the experimental class.

Table 2. Normalized Gain Test (N-Gain)

Class	N	n-gain	Category
R ₁	36	0.63	Medium
R ₂	36	0.55	

Table 2 shows that there is an increase in student learning outcomes, where the average of the two sample classes is in the medium category (medium), but the difference in value between the two is 0.08 with the experimental class being higher.

Table 3. Normality Test Results

	Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Student learning outcomes	Experiment	.121	36	.200*	.960	36	.213
	Pretest						
	Experiment	.125	36	.168	.951	36	.108
	Posttest						
	Pretest Control	.119	36	.200*	.953	36	.131
	Posttest Control	.129	36	.139	.950	36	.104

Before testing the hypothesis, the data were analyzed first through normality test and homogeneity test. The results of the normality test can be seen in Table 3. The normality test was carried out to review the distribution of the sample used from a population (Sudjana, 2005).

Table 4. Summary of Pretest Homogeneity Test

Class	α	F _{count}	F _{table}	Description
Experiment	0.05	0.82	1.76	Homogeneous

This test shows that the data distribution is normal, the basis for making decisions from this normality test using the Kolmogorov-Smirnov test if the sig value > 0.05 then the data is normally distributed (Santoso, 2012). The results of the homogeneity test can be seen in Table 4. Table 4 shows that F_{count} (0.082) < F_{table} (1.76). So it can be concluded that the two samples have a homogeneous variance with the provisions of a large level of 0.05 (Santoso, 2012). Based on the normality test and homogeneity test, it was found that the two classes of subjects were normally distributed and had homogeneous variants, so that hypothesis testing was carried out by t-test, as shown in Table 5.

Table 5. Summary of Hypothesis Testing

Class	Number of Student (n)	Average (\bar{X}) posttest	S	T _{count}	t _{table}
Experiment	36	83.5278	10.39089	2.04	1.994
Control	36	78.3056	11.24994		

Hypothesis testing is basically used to show the suitability of research hypotheses that have been proposed previously (Yusuf, 2016). The results of hypothesis testing are obtained that t_{count} (2.04) > t_{table} (1.994) which indicates that the research hypothesis is accepted because the sample class has significant differences in learning outcomes. In other words, there are significant differences in learning outcomes between students who study with the LSLC-based GIL learning model and conventional learning models on the material of class XII electrolysis cells at SMA N 5 Padang.

In this study, the results of hypothesis testing have proven that the LSLC-based GIL learning method can affect student learning outcomes effectively which cannot be separated from the LSLC activity itself. In this case, educators in the community plan a learning process that can be

implemented by model teachers. The second stage is do, at this stage the teacher appointed as the model teacher will carry out the learning design that has been prepared with the community and at this stage the community also observes the ongoing learning process. The third stage is see or reflection, at this stage it begins with the model teacher conveying the impression that is felt during the learning process then continues with the delivery of impressions and suggestions from all community members or observers (Sudirtha, 2017).

4. Conclusion

Based on the results of research and data processing, it can be concluded that there is an influence of the guided inquiry learning model based on lesson study for learning community on electrolysis cell material on the learning outcomes of class XII SMA N 5 Padang. This is evidenced from the results of the hypothesis that $t_{\text{count}} > t_{\text{table}}$, where the value of $t_{\text{count}} = 2.04$ and $t_{\text{table}} = 1.99$ then H_0 is rejected and H_a is accepted.

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