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# Improving chemical learning outcomes with explicit instruction learning models with quizizz evaluation media

Bropson Minanlarat<sup>1</sup>, Leony Sanga Lamsari Purba<sup>1,\*</sup> and St Fatimah Azzahra<sup>1</sup>

<sup>1</sup>Department of Chemistry Education, Faculty of Teacher Training and Education, Universitas Kristen Indonesia, Jakarta 13630, Indonesia

\*Corresponding author: LSLP, [leony.purba@uki.ac.id](mailto:leony.purba@uki.ac.id)

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**Abstract:** This study aims to determine the effect of explicit instruction learning models and the percentage of student learning outcomes improvement in chemistry. Explicit instruction learning model is the free variable while the dependent variable is learning outcomes. This research method is a quasi experiment with the research design nonequivalent control group design. The population of this study were students of Senior High School 42 Jakarta, the sample was selected by purposive sampling technique, consisting of two classes, namely class XI MIA 1 as the experimental class and XI MIA 2 as the control class. The results of the ttest show that the sig. (2-tailed) is smaller than the  $\alpha$  value, namely  $\text{sig } 0.000 < \text{sig } 0.05$ , so learning using the explicit instruction model has a significant effect on improving chemistry learning outcomes on hydrocarbon compound material. In addition, the use of explicit instruction learning models can improve student learning outcomes by 19% when compared with the use of conventional learning models (TCL).

**Keywords:** Explicit instruction, Quizizz, Chemistry learning, Learning outcomes

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## 1. Introduction

Competition in chemistry learning in the world is increasing in the era of technology 5.0. The results of the Asian level chemistry Olympiad prove that all countries are competing to become champions, including representative students from Indonesia (Purba et al. 2021). Teachers as a profession must be able to show their existence in contributing to competition in the global era. Competition in the global era was increasingly felt in the Covid-19 pandemic era (Gunawan et al. 2021), which resulted in a significant change in learning patterns from offline to online (Ichsan et al. 2021; Novira et al. 2021).

The paradigm of students towards online learning in chemistry subjects is different. Based on the results of a questionnaire distributed to students of Senior High School 42 Jakarta, 73.5% of the 34 respondents stated that they were interested in learning chemistry because chemistry is an interesting subject, it can be applied in everyday life and they also realize the importance of chemistry for the future. ahead of them. However, 61.8% of students stated that they felt bored during the learning process, because learning was teacher centered. According to [Siahaan et al. \(2021\)](#), teacher centered learning still dominates the learning carried out by teachers.

Innovation in the learning process is an important thing that must be considered by teachers so that teachers can facilitate students in learning ([Silaban, 2021](#)). According to [Silaban \(2017\)](#) paying attention to the learning model is an effort to adjust the steps of learning with learning tools including books, films, computers, curricula. Various kinds of learning models can be used to improve the quality of learning ([Junita & Purba, 2019](#); [Purba 2017](#)), but [Arends \(2001\)](#) argues that there is no one learning model that is the best among the others, because each learning model can be felt good, if it has been tested to teach certain subject matter. There are several kinds of learning models, one of which is the explicit instruction learning model ([Anwar & Lapenia, 2019](#)). The explicit instruction learning model is a teaching approach designed for procedural knowledge, declarative knowledge and various skills ([Komala, 2017](#)), which helps students learn basic skills and obtain information that can be taught step by step ([Silviana, 2016](#)). This learning model is often called direct learning ([Silma, 2017](#)).

The advantages of this explicit instruction learning model are being able to control important points or difficulties that students may face during the learning process ([Putri et al. 2017](#)), equipping students with disciplinary ways to view the world using alternative perspectives. "Which makes students aware of the limited perspective inherent in everyday thinking ([Sihombing, 2019](#)). Besides having advantages, explicit instruction learning model also has weaknesses. One of the advantages of this model is that active students have less space to develop their social competence ([Mastika et al. 2013](#)).

Various efforts to improve student abilities are without exception the teacher's attention ([Prastiwi & Nurita, 2018](#)). The step that can be done is by combining learning models with learning media ([Sihombing et al. 2020](#)). Learning models can be maximized if applied with the help of media to significantly improve learning outcomes ([Mansur, 2018](#); [Pujiyati, 2017](#)), and ([Metroyadi & Mardiah, 2018](#)). Various learning media tools can be accessed free of charge by students and teachers ([Saputro & Lumbantoruan, 2020](#)). There are learning media such as quizzizes ([Harefa, et al. 2020](#)); kahoot ([Purba, 2019](#)). Each of these media has strengths and weaknesses ([Cahyani, 2021](#); [Musyayadah, 2019](#)). In this study, using quizzizz media by considering the advantages of quizzizz, namely the existence of a leaderboard which provides an opportunity for all students to find out the grades and ratings of all students who took the quiz, thus motivating students to maximize their abilities during the quiz ([Amri & Sobri, 2020](#)).

The use of media quizzizes which is assisted in the explicit instruction learning model when learning colloids considers the characteristics of hydrocarbon material which are quite theoretical. Hydrocarbons are abstract chemical materials and need a high level of understanding, so that models and learning media that are not appropriate often students' scores are not optimal ([Qurniawati & Saputro, 2013](#)). With the use of explicit instruction

learning model assisted by media quizzes, it is hoped that it will be effective to improve student learning outcomes on the subject of hydrocarbons.

## 2. Methods

The research design with the quasi-experimental method was nonequivalent control group design, meaning that the two groups selected in this study were one experimental group and one control group (Sugyono, 2017). The research design is presented in Table 1.

**Table 1**  
Research Design

Group	Pretest	Treatment	Posttest
Experiment	O1	X	O2
Control	O1	K	O2

Information: X : Treatment using explicit instruction learning model; K: Using conventional learning models; O1 : Pretest of the experimental group and the control group; O2 : Posttest experimental group and control group

The population in this study were students of Senior High School 42 Jakarta in the even semester of the 2018/2019 academic year and the odd semester of the 2019/2020 school year. As for the sample to be examined in this study were students of class XI MIA Senior High School 42 Jakarta. The sampling technique was carried out in this study using a non-probability sampling technique with a purposive sampling method because of the difficulty of determining the class XI student learning schedule. In this study, the two classes selected were class XI MIA 1 as the experimental group and class XI MIA 2 as the control group.

To collect research data, a research instrument was prepared in the form of a test instrument in the form of multiple choice questions with options A, B, C, D and E. The instruments were arranged according to the indicators of hydrocarbon material. Before the instrument was used, the question instrument validation test was carried out with the expert judgment validation technique or the opinion of an expert, namely the lecturer of chemistry education, Faculty of Teacher Training and Education UKI Jakarta. From the validation results, from 40 questions obtained 30 valid questions. All 30 valid questions were used as instruments in the study.

Before analyzing the research data, a prerequisite test was carried out, namely the Kolmogorov Smirnov normality test (normal data if the significance value (Sig.) Is less than 0.05) and Leneve's homogeneity test (homogeneous data if the significance value (Sig.) Is greater than 0.05). Furthermore, analysis is carried out by testing the hypothesis. Hypothesis testing is used to determine the effect of experimental methods and explicit instruction models on improving student learning outcomes. Hypothesis testing in this study using the T test.

T test results can be seen if the value of Sig. (2-tailed) <0.05 then the hypothesis is proven, meaning that Ho is rejected and Ha is accepted. The hypothesis proposed in this study is:

Ho : There is no significant effect of explicit instruction learning model on student learning outcomes of class XI on hydrocarbon compound material.

$H_a$  : There is a significant effect of explicit instruction learning model on student learning outcomes of class XI on hydrocarbon compound material.

Statistical hypothesis:

If  $t_{table} < t_{count}$  then  $H_0$  is accepted and  $H_a$  is rejected.

If  $t_{table} > t_{count}$  then  $H_0$  is rejected and  $H_a$  is accepted.

To find out the magnitude of the increase, a gain test is carried out, which will be interpreted according to [Table 2](#).

**Table 2**  
Classification of Gain Index

Score Gain	Interpretation
0.71 - 1.00	High
0.31 - 0.70	Medium
0 - 0.30	Low

The percentage of the gain test is % of the results of the gain test = the value of the gain test x 100%. The prerequisite test analysis and data analysis test were carried out with the help of SPSS 23.

### 3. Results and Discussion

Based on the results of the control class pretest and the experimental class above, it is clear that the learning outcome scores owned by the students in the two classes are not different. This is because students in both classes are still in the initial knowledge stage, namely the extent to which students have knowledge about the hydrocarbon compound material taught by the teacher. Based on the research results, the pretest results were obtained as presented in [Table 3](#).

**Table 3**  
Pretest Results

Statistic	Pretest Control	Posttest Experiment
N	32	32
Mean	39.84	39.35
Median	40.00	40.00
Std. Deviation	9.35	8.73
Variance	87.47	76.24
Range	35	35
Minimum	20	20
Maximum	55	55

Based on the table above, the mean value for the control class pretest is 39.84 and the experimental class is 39.35. From these data, it can be seen that the initial abilities of the experimental and control class students are the same.

Furthermore, after being given the treatment of each sample according to the RPP, the posttest result data were obtained as presented in [Table 4](#).

**Table 4**  
Posttest Result

Statistic	Posttest Control	Posttest Experiment
N	32	32
Mean	71.13	80.32
Median	70.00	80.00
Std. Deviation	6.02	7.30
Variance	36.18	53.23
Range	30	30
Minimum	55	60
Maximum	85	90

Based on the table above, the average value of the control class is 71.13 and the experimental class is 80.32. From these data, it can be seen that the final abilities of the experimental and control class students are different.

The pretest result data was tested for normality with SPSS 23 and the results were as shown in [Table 5](#). Based on the data above, it was found that the data were normally distributed because the two classes were sig <0.05. After the normality test is carried out, the next prerequisite test is carried out, namely the homogeneity test with SPSS 23 and the results are as presented in [Table 6](#).

**Table 5**  
Results of Normality Test

Class	Kolmogorov-Smirnov <sup>a</sup>		
	Statistic	Df	Sig.
Experiment	0.153	31	0.006
Control	0.120	31	0.020*

**Table 6**  
Homogeneity Test Results

		Levene Statistic	df1	df2	Sig.
Learning Outcome Based on	Mean	1.59	1	60	0.21
	Median	1.79	1	60	0.18
	Median and with adjusted df	1.79	1	59.98	0.18
	Trimmed Mean	1.66	1	60	0.20

Based on the data above, it is found that the data is homogeneous because in both classes sig > 0.05. Furthermore, the data analysis test was carried out using SPSS 23, namely the tpaired test to test the hypothesis. Based on data analysis, the results obtained are as presented in [Table 7](#).

**Table 7**  
t-Paired Test Result

T-Test	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest Posttest	-40.96	6.24	1.122	-43.25	-38.67	-36.51	30	0.000

The results of the paired samples test show the tcount value of 36.510 with a digre freedom (df) 30. In addition, the table above also shows the sig. (2-tailed) value of 0.000. Based on the statistical t test, if the value of t count > t table or the value of sig. (2-tailed) <  $\alpha = 0.05$  then  $H_0$  is rejected and  $H_a$  is accepted. Given that the ttable value for df 30 is 2.042. Based on these data, it is known that  $t_{count} 36.510 > t_{table} 2.042$  and sig. (2-tailed)  $0.000 < \alpha = 0.05$ , it can be stated that  $H_0$  is rejected and  $H_a$  is accepted. Thus the posttest results in this study can test the truth of the hypothesis, so that the alternative hypothesis ( $H_a$ ) which states that there is a significant effect of the explicit instruction learning model on student learning outcomes is accepted. So that this research can show that learning using explicit instruction learning models can improve student learning outcomes on the subject matter of hydrocarbon compounds.

Furthermore, to find out how to improve student learning outcomes, a gain test is carried out. After obtaining the results of the pretest and posttest in the two classes, then the calculation of the difference between the pretest and posttest results is carried out to determine the effect of the learning model. The results of the gain test for the control class and experimental class can be seen in [Table 8](#).

**Table 8**  
Gain Test Results

Class	Gain Test Result	Information
Control	0.51	Medium
Experiment	0.72	High

Based on the table above, it is known that the gain value for the control class is 0.51 and for the experimental class is 0.72. If the gain value of the two classes is interpreted into the gain index classification, then the control class is included in the medium criteria while the experimental class is included in the high criteria. So it can be concluded that the increase in student learning outcomes in the experimental class using the explicit instruction learning model is higher than the control class that uses the conventional learning model. As for the percentage gain test for the experimental class is  $0.72 \times 100\% = 72\%$  and for the control class is  $0.5 \times 100\% = 50\%$ .

The increase in student learning outcomes in the high category is the output of developing student knowledge in a procedural and declarative manner by applying the Explicit Intruction model, which is one step so that students can understand and truly know knowledge thoroughly and actively in learning regularly, step by step. stages ([Yasa, 2012](#)), as

well as the assistance of quizizz learning media which can increase achievement motivation in students (Noor, 2020).

#### 4. Conclusion

There was a significant increase in the learning outcomes of chemistry by using the explicit instruction learning model with the help of the quizizz learning media.

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