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2. SCOPE: 78%
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Application of Scramble Learning Model To Improve Learning Outcomes of Chemistry Study High School Students 3 South Tambun

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Keywords: Chemistry learning outcomes, Scramble learning model.

Abstract: Chemistry learning at SMAN 3 Tambun Selatan is still dominated by teacher-centered information delivery, sample modeling and practice questions. As a result, students are less interested and more passive in the process of learning chemistry. Based on the results of the chemistry learning process questionnaire that has been filled out by students of class X and XI of SMAN 3 Tambun Selatan FY 2018/2019 the results obtained in the statement are able to understand the chemistry obtained answer "yes" as much as 42.5%, do not feel difficulties in learning chemistry obtained "yes" answers as much as 6.3%, and able to do chemical tasks without cheating obtained "yes" answers as much as 16.8%. So, it can be said that the chemistry learning outcomes of SMAN 3 Tambun Selatan is very lacking. This study aims to determine the increase in chemistry learning outcomes of students at SMAN 3 Tambun Selatan TA 2018/2019. This study uses a pretest-posttest control group design. The study population was students of class X IPA SMAN 3 Tambun Selatan TA 2019/2020. The research sample consisted of two classes, namely class X IPA 4 as an experimental class using a scramble model and X IPA 5 as a control class without using a scramble model with a sample of 62 students. Normality and homogeneity tests use the Kholmogorov-Smirnov test and the Levene test. Hypothesis testing uses Paired sample t-test on the hypothesis of learning outcomes. There is an increase in chemistry learning outcomes. In the hypothesis test H_a learning outcomes are accepted, with the value of t arithmetic $(29,133) > t$ table $(2,000)$.

1 INTRODUCTION

Education plays an important role for the development of a nation. With education, a nation can achieve progress in all fields. Learning activities in Indonesia emphasize the transfer of knowledge and training (Murjani and Hamid, 2016). In order to improve the quality of education in Indonesia the government made improvements to the curriculum from the KTSP curriculum to the 2013 curriculum which is a change in the learning process in turning students into active ones. However, the way of learning chemistry has not changed much. In general, learning chemistry in high school is still dominated by the delivery of information that is centered on the teacher, giving examples and practice questions (Subagia, 2014). This is what can make students passive in the learning process. Chemistry is one of the subjects of high school students in the Mathematics and Natural Sciences (MIA) program. The goal of chemistry learning is that students are expected to be able to achieve better learning

outcomes and students have more active roles in the learning process (Purba, 2017).

Chemistry lessons contain concepts and calculations related to daily life (Arafah and Hamid, 2016). The atomic structure is one of the class X chemicals taught at the beginning of the meeting. The importance of mastering this atomic structure material because it is the basis for students to study chemistry. The material is a gateway for students' understanding of further chemical materials. However, in the learning process teachers still tend to use teacher-centered learning methods (Arfiyah, et al, 2016). As a result, many students are less interested and feel bored with chemistry so that they are more passive in the learning process. There are still many problems in learning chemistry, such as difficulties in understanding chemical concepts, difficulties in chemical calculations, as well as difficulties in connecting concepts with daily life that can cause low learning outcomes in chemistry (Jauhariningsih, 2017).

Student learning outcomes are influenced by two factors, namely internal factors and external factors. Internal factors include fatigue, physical, and psychological factors, while external factors include family, community and school factors. Student learning outcomes show the ability and quality of students as an impact of the learning process that has been passed (Nurhasanah and Sobandi, 2016: 129). The interaction between educators and planned students both inside and outside the room to improve students' abilities is determined by learning outcomes (Afandi, Chamalah and Wardani, 2013). The learning outcomes according to Afandi, et al (2013) classified into three realms, namely cognitive, effective, and psychomotor. The cognitive domain includes learning outcomes related to memory, knowledge, and intellectual abilities. The learning process is considered successful if the absorption of the teaching material being taught reaches high achievements, both individually and in groups (Zaenab, 2018). Student learning assessments conducted by teachers are guided by competencies and indicators of competency achievement. There are three forms of assessment techniques for learning chemistry, namely test techniques, non-test techniques, and alternative techniques.

Problems in chemistry subjects at SMA Negeri 3 Tambun Selatan based on the results of interviews with chemistry teachers at SMA Negeri 3 Tambun Selatan ie many students think that chemistry lessons are difficult to understand, most students lack an active role in learning, do not complete assignments on time, and cheating answers from friends, many students have not been able to meet the minimum completeness criteria (KKM) in the test, students who score above the KKM in the daily exam are not more than 40%. In fact, the minimum completeness criteria (KKM) for chemistry subjects is 70. This is also supported by the results of the chemistry learning process questionnaire that has been filled out by students of class X and XI of SMAN 3 Tambun Selatan. Where in the statement of being able to understand chemistry obtained an "yes" answer as much as 42.5%, did not feel difficulties in studying chemistry obtained an "yes" answer as much as 6.3%, and were able to do chemical assignments without cheating as much as a "yes" answer, 16.8%. In addition, the teaching method applied is still using teacher-centered learning methods, question and answer and group discussions.

Thus, many students are less interested in learning chemistry. This of course can have an impact on decreasing student chemistry learning

outcomes of SMAN 3 Tambun Selatan. Based on data from the 2019 UNBK obtained from the data of the Ministry of Education and Culture the average UN score on chemistry subjects at SMAN 3 Tambun Selatan was 48.81. The absorption value of the indicator tested in the National Examination is to determine the exact statement relating to the statement and picture of the atomic model only obtained numbers of 30.23 and the indicator determines the relationship of the notation of elements, protons, neutrons, electrons, orbital diagrams and electron configurations as well as location elements in the periodic table are only 33.72.

It is necessary to develop innovative and creative learning that can foster enthusiasm and strengthen students' memory of the material to be learned (Zaenab, 2018). This is consistent with the results of previous research which states that there is an increase in student chemistry learning outcomes taught by applying power point media on NHT type cooperative learning (Simatupang, 2016). The problems of chemistry learning outcomes can be overcome by implementing learning models that will actively involve students in learning. One learning model whose characteristics can improve student chemistry learning outcomes is the scramble model. In this model, they are not only asked to answer questions, but also guess quickly the answers to questions that are already available but in random conditions. Student score results are determined by how many questions are correct and how quickly the questions are answered. The scramble learning model has several advantages that appear directly in the learning process, namely making it easier for students to find answers, encouraging students to learn to work on the problem, making lessons more interesting, making students challenged to work on existing problems in the game, and make students more active (Sitompul, 2018). Therefore this model can be used as an alternative to create varied conditions in teaching and learning activities and help teachers in solving problems in learning, such as the low student learning outcomes.

2 METHOD

2.1 Research Design

The study was conducted at SMA Negeri 3 Tambun Selatan class X IPA in the academic year 2019/2020. This research is a quasi-experimental study using a Pretest-posttest control group design research design. In this design there are 2 groups chosen randomly.

The effect of the treatment is (O2-O1) - (O4-O3). The classes used in this study are the experimental class and the control class. The experimental class was treated with a scramble model while the control class used a teacher-centered learning method. The research design can be described as figure 1 (Sugiyono, 2017).

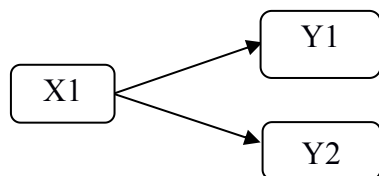


Figure 1 : Research design

Information :

- X1 = Scramble learning model
- Y1 = Interest in learning chemistry
- Y2 = Chemistry learning outcomes

2.2 Population and Sampling Techniques

The population in this study were all students of class X IPA of SMA Negeri 3 Tambun Selatan in the 2019/2020 school year as many as 214 students consisting of X IPA 1 to X IPA 6. Determination of the study sample was done by simple random sampling. Class to be used in this study as many as 2 classes namely class X IPA 4 and X IPA 5.

2.3 Data Collection Technique

Data collection techniques used in this study were interviews (unstructured interviews) and tests.

2.4 Research Instruments

The test instrument used in this study was in the form of multiple choice with C1-C3 cognitive domains. The test instrument uses difficulty levels with easy, medium and difficult questions. Validation Techniques The test instrument uses the content validity and the construct validity. Reliability test for the items used Cronbach alpha technique. Analysis of construct validity and item reliability using the SPSS 16.0 For Windows application. Calculate the level of difficulty of the questions and the different power of problems by using the Microsoft Office Excel 2007 application.

2.5 Test Requirements Analysis

The normality test in this study used the Kolmogorov-Smirnov test with the help of SPSS 22 for Windows. Data is said to be normally distributed if the significance value of the output window of test of normality $> \alpha = 0.05$. For homogeneity test used Levene-Test with the help of SPSS 22.0 for windows. Homogeneity test results of the variant are said to be homogeneous if $F_{hit} < F_{tab}$ ($F_{\alpha} (dk1, dk2)$), with $\alpha = 1\%$ or sig value > 0.05 .

2.6 Data Analysis Technique

The main data used to see an increase in chemistry learning outcomes is the pretest and posttest results data. If the requirements are met that the sample comes from a normal and homogeneous population then data analysis will be performed. Analysis of improvement in learning outcomes using paired t-test with the help of SPSS 22.0 for windows.

$$H_a: \mu_1 \geq \mu_2$$

$$H_o: \mu_1 < \mu_2$$

In this party test applies the provision that, if the price of t arithmetic is smaller (\leq) or equal to the price of t table, then H_o is accepted and H_a is rejected (Sugiyono, 2017). Data on chemistry learning outcomes can be presented in the form of frequency distribution tables and histograms.

3 RESULT

Before being given treatment in the control class and the experiment is pretested to know the initial conditions of students.

3.1 Description of Pre-test Post-test Data Learning Outcomes of Chemistry Experiment Classes

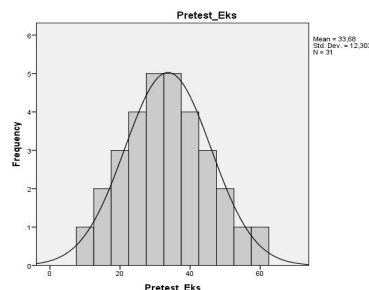


Figure 1 Histogram description of pretest data on the learning outcomes of experimental class chemistry.

Based on the pretest data of chemistry learning outcomes in the experimental class, there were 31 students in each class. Obtained mean data at pretest of 33.68 and at posttest of 90.61 with the difference in the mean score of the pretest-posttest data of 56.93. If seen from the pretest, the median score is 35.00 while the posttest is 87.00. The pretest standard deviation score in the experimental class was 12.303 and the posttest was 6.731. The minimum pretest score in the experimental class is 10 while the posttest is 80.

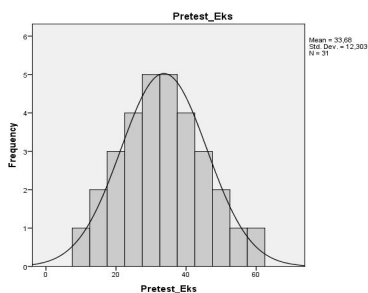


Figure 4.4 Histogram description of posttest data on learning outcomes of experimental class chemistry

3.2 Description of Pre-test Post-test Data on Learning Outcomes of Control Class Chemistry

The data obtained before and after the research is the pretest-posttest data which is used to ascertain whether there is an increase in the chemistry learning outcomes of students of Class X Science 4 and X Science 5 of SMAN 3 Tambun Selatan in Academic Year 2019/2020.

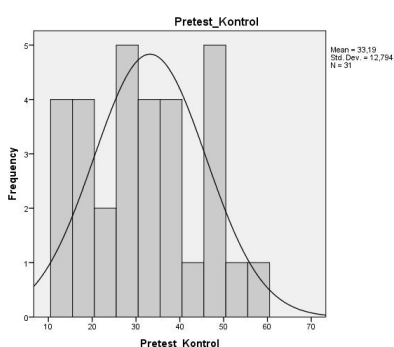


Figure 4.1 Histogram description of pretest data on the results of chemistry learning control class.

Based on the pretest data the learning outcomes in the control class have a total of 31 students each

class. Obtained mean data at pretest of 33.19 and at posttest of 83.35 with the mean score difference from the pretest-posttest data of 50.16. If seen from the pretest, the median score is 35.00 while the posttest is 87.00. The pretest standard deviation score in the control class was 12.794 while the posttest score was 6.897. The minimum pretest score in the control class is 13 and the posttest is 67.

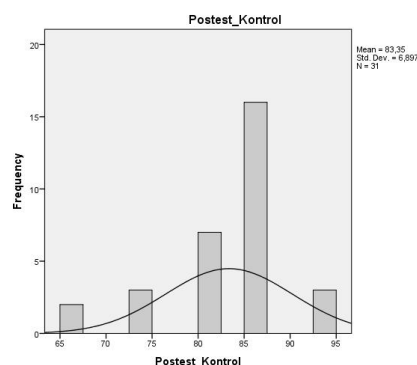


Figure 4.2 Histogram description of posttest data on the results of chemistry learning control class.

3.3 Analysis of Research Instruments

The type of test validity test consists of 2 test instruments namely content validity test and construct validity test. The content validity was carried out with the assistance of the Teaching and Education Faculty lecturers namely Ms. Elferida Sormin, S.Si, M.Pd and Mr. Nelius Harefa, S.Si, M.Pd as expert validators. The item test instrument prepared by the researcher was 47 items with 40 valid items and 7 invalid items. As for the test of the construct validity of the test instrument the questions were tested on students of class X IPA 2 of SMAN 3 Tambun Selatan in Academic Year 2018/2019 as many as 32 people. The test questions that will be submitted to students of class X Science 2 in the 2018/2019 school year of SMAN 3 Tambun Selatan contain 39 test items. The significance level is 5% with $N = 32$ ($df = 32 - 2 = 30$, $\alpha = 0.05$). Then obtained $r_{table} = 0.291$. If $r_{arithmetic} > r_{table}$ then the item can be said to be valid. The validity test results of the test instrument were calculated with the help of Microsoft Office Excel 2007.

Overall the items can be declared valid as many as 31 items by having the value of $r_{count} > r_{table}$. So based on the results of calculations there are 31 statements can be used in this study. However, researchers used 15 statements that were used as a

test item to measure student chemistry learning outcomes.

3.4 Reliability Test

Chemistry learning reliability test results from the Cronbach's Alpha value of 0.833 which shows that the value of r_{11} obtained > 0.05 . So it can be concluded that the measuring instrument that researchers used in the study of chemistry learning outcomes was reliable because the Cronbach's alpha value > 0.05 . Based on the validity and reliability tests above, there are 31 items that can be used to retrieve data on the chemistry learning outcomes of students in class X IPA 4 and X IPA 5 SMAN 3 Tambun Selatan.

3.5 Level of Problem Difficulties

Based on the calculation of the level of difficulty, the questions are divided into three categories: easy, medium, and difficult. For categorical questions, it is easy to find numbers 12, 16, 22, 23, 35. For categorical questions, they are number 3, 4, 5, 6, 7, 9, 11, 13, 14, 15, 19, 21, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 36, 37. Meanwhile, for categorical questions, it is difficult to find numbers 38, 39.

3.6 Different power

Based on the results of the calculation of different power problems divided into three categories, namely good, enough, and bad. For good categorical questions, there are numbers 7, 24, 25, 26, 27, 30, 37, 38, 39. For categorical questions, there are enough in numbers 3, 4, 5, 9, 11, 15, 21, 22, 23, 28, 33, 34, 36. Meanwhile, for the bad category questions found in numbers 6, 12, 13, 14, 16, 19, 31, 32, 35. Based on the calculation of the problem analysis, the questions that can be used as research instruments are 3, 4, 6, 7, 11, 12, 19, 21, 23, 24, 13, 15, 38, 39 and 26.

3.7 Test Requirements Analysis

Before giving treatment to the experimental class and the control class the researcher conducted a pretest. After the pretest data was obtained the researchers conducted a data normality test with the help of SPSS 22 using the kholmogorov-smirnov test. Based on SPSS 22 output for windows, the sig value is 0.200. Data can be said to be normally distributed if the value of $\text{sig} > 0.05$. Thus, the data in the experimental and control class can be said to be

normally distributed because the results of the sig data pretest learning outcomes > 0.05 .

Homogeneity test in this study uses the lavene test method based on the significance value. If the significance value or $\text{sig} > 0.05$ and the value of Lavene statistics $F_{\text{arithmetic}} < F_{\text{table}}$, then it can be said that the variance of the data population is the same or homogeneous. The data used in this test are pretest values from the experimental and control classes. Based on the SPSS 22.0 output, a sig value of 0.186 is obtained. The data can be said to be homogeneous if the sig value > 0.05 . Thus, the data in the experimental and control classes can be said to be homogeneous because the results of the pretest data sig values are greater than 0.05. In addition, based on the results obtained, the calculated F value (0.625) $< F_{\text{table}}$ (3.17).

3.7 Hypothesis test

The main data used to see improved learning outcomes are the pretest and posttest results data. Analysis of improvement in learning outcomes using paired t-test with the help of SPSS 22.0 for windows. Based on the results of SPSS 22.0 output shows that there is an increase in chemistry learning outcomes. So, it can be said that in the hypothesis test the learning outcomes of H_a are accepted. This is indicated by the value of t arithmetic (29,133) $> t_{\text{table}}$ (2,000).

Table 1. Learning Outcomes

t_{hit}	t_{tab}	Conclusion
29,133	2,000	H_a be accepted

Improved chemistry learning outcomes by applying the scramble learning model and without applying the scramble model can be seen by calculating the gain score. Here are the average gain scores in the control and experimental classes.

Table 2. Comparison of Average Control and Experiment Class Gain Scores

Class	Mean gain score	Gain score criteria	Category
Control	0,7508	$g > 0,7$	High
Experiment	0,8585	$g > 0,7$	High

Based on the table above, the results obtained from the control class and experimental gain tests are 0.7508 and 0.8585. Based on table 4.1 the gain score in the control class is $g (0.7508) > 0.7$, with a high category. In the experimental class with a gain score $g (0.8585) > 0.7$, in the high category.

Although, the gain in the control class and experiment both have a high category. However, the highest increase in chemistry learning outcomes occurred in the experimental class with an average gain score of 0.8585.

4 DISCUSSION

The purpose of this study was to determine the increase in student chemistry learning outcomes using the scramble learning model. This study was applied to two classes with atomic structure material and the development of atomic theory with a research sample of 71 students. The first step taken by researchers is to conduct observations by conducting interviews with chemistry teachers at SMAN 3 Tambun Selatan and giving questionnaires to the process of chemistry learning at students of SMAN 3 Tambun Selatan class X and XI Science. Based on the results of interviews with chemistry teachers and the results of the chemistry learning process questionnaire that have been filled out by students of class X and XI that the current problem is the decline in student chemistry learning outcomes of SMAN 3 Tambun Selatan.

The study was conducted in class X due to the first introduction of chemistry subjects in class X. Marshall in Darmadi (2017) said that children have an interest in learning. According to Darmadi (2017), learning must be able to attract attention as an example of teaching in an interesting way using props, developing / compiling evaluation tools, and planning programs using appropriate learning models. Therefore, the researcher wants to apply the Scramble learning model which in its application uses the media in the form of randomized question cards and answer cards and students will rearrange them correctly in groups. Thus, by using this model the researcher hopes that the students' chemistry learning outcomes will increase after being treated.

The first thing that researchers do is validate the test instrument that will be used at the time of the study. In a multiple choice question test, before the question is validated the researcher makes 47 questions. After content validation and construct validation, 31 valid statements were obtained with a reliability of 0.833. About 15 questions will be used during the research. The selection of questions to be used at the time of the study is based on indicators of achievement of competence, cognitive domain, level of difficulty, and different power. The cognitive domain used is C1 to C3 with a problem ratio of 1: 1:

1. The cognitive domain is the first indicator C1-C2, the second and third indicators C1-C3.

After determining the research instrument, the researcher conducted a pretest to get the results of normality and homogeneity tests in the control and experimental classes. Based on the pretest data of the chemistry learning outcomes obtained, the normality and homogeneity test in the control and experimental classes is 0.200 and 0.186. This shows that the control class and the experimental class are normal and homogeneous. Thus, researchers used the parametric test as a follow-up test to test the hypothesis. The hypothesis test used to test the improvement in learning outcomes is the paired sample t-test.

After the students do the pretest, the next step is to give treatment to the control class and the experimental class. In the experimental class treatment was given to the Scramble learning model. Meanwhile, the control class uses the conventional method, the lecture method. At the first meeting when giving treatment in class X IPA 4, namely explaining the material (first syntax) as a whole is still not good. This happens because the teacher and students are still in a condition of adjustment to the learning atmosphere. When explaining the material there were still some students who did not focus on learning but the researcher could control the situation conductively by giving questions verbally to students who were not focused during the learning process. When the researcher explained that he would play while learning by playing cards, the experimental class students were very enthusiastic listening to the explanation from the researcher. When giving researchers their own treatment that determines the group of students in the experimental class. Thus, the achievement of interest in learning chemistry is not optimal. In fact, in the application of the scramble model prioritizes the freedom of students to have feelings of pleasure and comfort in their respective study groups. This means that students of Science X 4 really want a change of atmosphere in the way of learning that the teacher applies so that it can stimulate student interest in learning.

At the second meeting, students of Natural Sciences 4 were more enthusiastic in hearing explanations from researchers because after explaining the material would be continued with playing cards. This is what makes students enthusiastic in learning chemistry. In the control class, when explaining the material there are still students who are not focused in the learning process. When the researcher gave the practice questions to

be done, only 13 students collected the answer questions from the practice questions. Meanwhile, some other students did not complete the exercise questions and asked to be made homework. There were no students who had finished their training assignments as homework assignments at the second meeting. This shows that the students feel bored when given a monotonous training assignment. Required changes in the method of giving assignments or ways of teaching students / i.

After being given a pretest and treatment, the next step is to provide a posttest to get data on the improvement of student chemistry learning outcomes on the material of atomic structure. The results of the pretest and posttest data were analyzed to see an increase in learning outcomes. Based on the pretest data of learning outcomes obtained, the mean in the control class is 33.19. While the mean posttest in the control class was 83.35. Difference in mean pretest-posttest data was 50.16. The minimum pretest score in the control class was 13 while in the posttest it was 67. Based on the pretest data the learning outcomes obtained, the mean in the experimental class was 33.68. While the mean posttest in the experimental class was 90.61. Difference in mean pretest-posttest data was 56.93. The minimum score of pretest in the experimental class was 10 while in the posttest it was 80.

Based on the posttest data the results of learning chemistry were obtained, the mean in the control class was 83.35. While the mean in the experimental class was 90.61. This shows that the mean posttest results of the experimental class are higher than the mean posttest results of the control class. Next is the hypothesis test, the H_a chemical test learning outcomes hypothesis is accepted, this is indicated by the value of t arithmetic $(29,133) > t$ table $(2,001)$. Therefore, it can be said that there is an increase in student chemistry learning outcomes. Based on the N -gain test data obtained the results of the learning outcomes gain in each control and experimental class of 0.7508 and 0.8585. In the control class with a gain score $g (0.7508) > 0.7$. If seen based on the criteria for the gain score in table 4.1, a large increase in learning outcomes that occur in the control class in the high category. Meanwhile, in the experimental class with a gain score of $g (0.8585) > 0.7$, a large increase in learning outcomes occurred in the experimental class in the high category. Although, the gain in the control class and experiment both have a high category. However, the highest increase in learning outcomes occurred in the experimental class with an average gain score of 0.8585. There is a high increase in learning

outcomes in the control class because the selection of questions to be used is not in accordance with the level of cognitive domain, the level of difficulty, and the different power of the questions. Although there are several problems in the research process. However, based on the results of these studies it can be concluded that the teacher needs to arouse the desire to learn in a fun way so that learning outcomes can be improved.

5 CONCLUSION

- a. There is an increase in the chemistry learning outcomes of students at SMAN 3 Tambun Selatan by applying the scramble learning model obtained based on a hypothesis test using paired sample t -test with t count $(29,133) > t$ table $(2,000)$. This means that H_{a2} is accepted and H_{02} is rejected. Gain test results respectively in the control and experimental class obtained 0.7508 and 0.8585.
- b. Learning using scramble learning models that are applied to the atomic structure material and the development of the atomic model is proven to improve student chemistry and learning outcomes

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