

The Influence of The Use of The Chemical Ludo Educational game On Environmental Pollution Material On The Learning Outcomes of Class VII Junior High School Student

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Abstract — This research is motivated by the availability of Ludo chemistry educational games on environmental pollution material where it has not yet reached the stage of knowing the effect of the impact on learning outcomes. This study aims to determine the effect of the use of the educational game Ludo Kimia on environmental pollution material learning outcomes for class VII students of SMPN 34 Padang. The type of research used was a quasi-experimental with a post-test only control group design. The population in this study were seventh grade students of SMPN 34 Padang. The sample selected using purposive sampling technique is class VII7 as the experimental class and class VII8 as the control class. Sources of data obtained from the post-test results and data analysis techniques using independent t-test (t-test). Based on data processing, the results of cognitive learning in the experimental class (80) were higher than the control class (71.72) and test analysis (t) namely $t_{count} 2.3102 > t_{table} 2.00404$ at the real level = 0.05 with $dk = 55$ and the probability $t0.95$. Furthermore, it is also supported by the percentage of mastery learning, the experimental class obtained 78.6% while the control class only obtained 55.2%. Based on the results of data analysis, it was concluded that there was a significant effect on the use of educational games on student learning outcomes of environmental materials at SMPN 34 Padang.

Keywords: influence, chemical ludo, environmental pollution, learning outcomes.

I. INTRODUCTION

Environmental pollution material is one of the SMP/MTS science subjects studied in class VII in the second semester contained in the 2013 revised 2018 Curriculum. Learning based on the 2013 curriculum demands a scientific approach in the form of student-centered learning. In the scientific approach, there are stages including observing, asking questions, collecting data, associating and communicating [1]. Environmental pollution material contains factual and conceptual knowledge. Based on the results of interviews that have been conducted with two science teachers at SMPN 34 Padang, it was found that in the learning process of environmental pollution teachers use textbooks as learning media. The exercises provided by the teacher are also sourced from textbooks that have been provided at the school and are individual in nature. This causes low active participation of students when doing exercises, which will certainly have an impact on consolidating concepts and learning outcomes.

The relationship between practice in the learning and teaching process is an act or act of repetition that aims to strengthen the concept [2]. Exercises can be done individually or in groups, but individual exercises tend to be less interesting, less varied, and less competitive. Exercises that are done in groups are varied and have an element of competition, this is considered to be able to increase student active participation and the learning atmosphere becomes fun, one of which is by doing exercises in the form of games. [3]. Games make students actively participate in the learning process because students compete to win the game. In addition,

it can also cause feelings of pleasure in students in the learning process [4]. The advantage of the game is that it causes active participation from students to learn [5]. In the game there are also practice questions, where students are expected to be active in doing exercises compared to working on practice questions in the book. Learning media in the form of games that can be used in chemistry learning, one of which is a modified ludo game. This game is modified by including a general description related to environmental pollution material so that it can help students master factual and conceptual knowledge. Based on the results of relevant research related to learning media in the form of games, it was found that the mathematics learning outcomes of students who received learning with Monopoly Mathematics (Monotika) media were better than students who received direct learning in class VII SMP Negeri 7 Balikpapan. [6]. In addition, the use of call card games has a positive effect on learning outcomes [7]. Based on the description above, an educational game of Ludo Chemistry has been developed as a learning medium on environmental pollution material [8]. This media has been tested for validity and practicality, however, its effect on learning outcomes has not been carried out.

II. METHOD

In this study, the type of research used is Quasi Experimental Research or quasi-experimental. The type of research used has a control group. However, it does not function fully in controlling the external variables that carry out the research [9]. This research was conducted at SMPN 34 Padang with the research population being grade VII students for the 2020/2021 academic year. The sampling technique uses a purpose sampling technique where sampling is carried out through certain considerations. The sample in this study were 29 students of class VII7 and 28 students of class VII8. The research design used was a post-test only control group design. This design uses a group of research subjects from a certain population, then they are grouped into two class groups, namely the experimental class and the control class [10]. The form of the research design is presented in Table 1.

Table 1. The form of the research design post-test only control group design

Class	Treatment	Posttest
Experiment	X	Y
Control	-	Y

Information :

X = Learning to use the educational game Ludo chemistry learning media on environmental pollution material

Y = Final test of experimental and control class.

The difference in treatment was given to the two classes, where in the experimental class, the exercises given were in the form of an educational game of Ludo Chemistry. While in the control class, the exercises were given without using the Ludo chemistry educational game. The variables used are independent variables, dependent variables and control variables. a). The independent variable is the variable that affects or gives rise to the dependent variable [9] The independent variable in this study was the sample class that was given different treatment from other classes, namely the experimental class that used learning media in the form of the Ludo Chemistry educational game while the control class did not use the Ludo Chemistry educational game learning media. b). The dependent variable is the variable that is the result or the variable that is influenced, because of the independent variable, in this study the dependent variable is the student learning outcomes obtained from the post-test results in the experimental class and control class [9]. c). Control variables are variables that are outside constant or controlled variables so that the relationship between the independent variable and the dependent variable is not influenced by external factors that are not careful [9]. The control variables in this study are the teachers who teach in the sample class, the material being taught, the time allocation and the textbooks used. The instrument in this study was a test of learning outcomes in the form of objective questions with 4 answer choices. The test used has passed the criteria of validity, reliability, discriminating power of questions and the index of difficulty of the questions. The data analysis technique used was the normality test, homogeneity test and hypothesis testing with the data source being post-test.

III. RESULT AND DISCUSSION

3.1 RESULT

The effect of learning outcomes using the Ludo chemistry educational game exercise was carried out by giving post-tests for both sample classes. The questions consist of 20 items with cognitive level C1-C4. The average post-test scores for the control class and the experimental class are presented in Table 2.

Table 2. Average post-test scores for the control class and the experimental class

Class	Total students	Post-test Average
Control	28	71,72
Experiment	29	80

Based on Table 2, the average post-test value of the experimental class was higher than the control class. This proves that the Ludo Chemistry educational game has an influence in improving student learning outcomes. The results of the study were proven by hypothesis testing. Hypothesis testing was carried out after normality and homogeneity tests to determine whether the data were normally distributed and homogeneous. The percentage of completeness is used to find out what percentage of students can achieve scores above the minimum completeness criteria (KKM).

3.1.1 Normality Test

The normality test of the data was carried out with the Liliefors test. The data is said to be normal if the value of $Lo < L_{table}$. The results of the post-test normality test for the experimental class and the control class are presented in Table 3.

Table 3. Sample Class Normality Test Results

Class	α	Lo	Lt	Conclusion
Eksperimen	0,05	0,145	0,167	Normal distribution
Kontrol		0,151	0,165	

Based on Table 3, it is obtained that Lo is smaller than Lt at the real level = 0.05. This proves that the learning outcomes of the experimental class and control class are normally distributed.

3.1.2 Homogeneity Test

The homogeneity test of the data was carried out with the F test. The data was said to be normal if the value of $F_{count} < F_{table}$. The results of the post-test homogeneity test for the experimental class and the control class are presented in Table 4.

Table 4. Sample Class Homogeneity Test Results

Class	α	F_{hitung}	F_{tabel}	Conclusion
Eksperimen	0,05	1,02	1,90	Homogen
Kontrol				

Based on Table 4, F_{count} is smaller than F_{table} at the real level = 0.05. This shows that the experimental class and the control class have a homogeneous variance.

3.1.3 Hypothesis testing

Based on normality and homogeneity tests, the samples were normally distributed and had homogeneous variance. Hypothesis

testing is done by independent t-test (t-test). The results of hypothesis testing for the experimental class and the control class are presented in Table 5.

Table 5. Sample Class Hypothesis Test Results

Class	t_{hitung}	t_{tabel}	Conclusion
Eksperimen	2,3102	2,0040	H_0 rejected H_1 accepted
Kontrol			

Based on Table 5, the results of the hypothesis test were obtained by large t_{count} compared to t_{table} . This proves that H_0 is rejected and H_1 is accepted. Processing the data, it was found that the value of student learning outcomes using the Ludo Chemistry educational game for environmental pollution was significantly higher than the learning outcomes of students who did not use the Ludo Chemistry educational game.

3.1.4 Mastery of learning outcomes

The percentage of mastery learning outcomes is used to determine the completeness of student learning outcomes in the experimental class and control class on the use of the Ludo chemistry educational game. Based on the Minimum Completeness Criteria (KKM) at SMPN 34 Padang, which is 68, so the percentage of completeness learning outcomes for the experimental class and control class is presented in Table 6.

Table 6. Percentage of Study Completeness in the Sample Class

Class	Total Students	Number of Students Completed	Completeness Percentage	Number of Unfinished Students	Percentage of Incompleteness
Experiment	28	22	78,6 %	6	21,4 %
Control	29	16	55,2 %	13	44,8 %

In Table 6, it is found that the percentage of learning completeness in the experimental class is 78.6% in the good category, while in the control class the percentage of learning completeness is 55.2% in the less category.

3.2 DISCUSSION

Giving practice during the learning process is very useful, because it is useful for strengthening concepts to students regarding the material that has been taught. Giving training to the experimental class using the Ludo chemistry educational game as a learning medium was carried out at the IV meeting for approximately 60 minutes. The time allocation is adjusted to the learning time in one meeting. Meanwhile, in the control class, the training was given using school textbooks which carried out at the fourth meeting for all materials with the same time allocation, which was 60 minutes. After giving training for the two sample classes, then the sample class was given a posttest.

Based on the results of the posttest, the average for the experimental class was 80 while in the control class it was 71.72. Based on this, there are significant differences in learning outcomes. The learning outcomes of the experimental class students are significantly higher than the control class, which is the effect of using the Ludo chemistry educational game as a learning medium. In the use of educational games Ludo chemistry as a medium of learning can involve students playing an active role in learning. [11] suggests that learning that is carried out with the help of the media, the learning will have a high value in a long grace period so that the learning outcomes obtained are better when using media in learning. In the use of learning media for the learning process, it can provide psychological influence on students, provide motivation in learning for students, and be able to arouse students' interest in participating in learning [2].

When doing exercises with game media, students are carried out in groups, to continue to comply with the Covid-19 health

protocol, it is done by providing distance between students and students are required to wear masks. Exercises carried out in groups will foster collaboration and interaction between group friends. This can be seen when students do the exercises using the educational game Ludo chemistry as a medium of learning with their group mates in the experimental class. The use of games results in interactive, collaboration with their group friends so as to encourage student activity in learning [12]. Exercise in the form of this game media contains many questions so that students will often answer questions so that students can win the game so that the consolidation of student concepts will be better. Fun games will make students feel happy and not burdened so that there is active participation in doing the exercises. This media game attracts students' attention and this can be seen when using the Ludo Chemistry educational game as a learning medium, students become interested in doing the exercises. The advantage of games as learning media is the creation of active participation from students [5].

The game also makes an interesting experience for students in doing exercises to strengthen the concept. In doing this exercise is done while playing so as to create a pleasant atmosphere. Game media can provide an interesting experience for students in understanding a concept as well as strengthening concepts that have been understood and can make the learning environment more enjoyable [13]. Games in learning are useful in making learning classes more active where at first the atmosphere is passive, from the start it is stiff it can become relaxed and students who are initially bored can be happy with the game as a learning medium [14].

In the use of the Ludo Chemistry educational game as a learning medium, the principles of learning the theory of cognitivism have been applied. According to this theory, knowledge comes from action, depending on how far students are active in learning activities. In the learning process, the dominant point is the formation of a cognitive structure as a problem-solving effort. While in the control class, the learning is done without using the Ludo chemistry educational game. So that students in the process of working on the exercise are faced with questions that do not vary which results in boredom. And some students only see the answers from their friends, as a result, the expected consolidation of the concept of providing training will not be achieved so that the learning outcomes of the control class are not optimal.

IV. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the use of the Ludo Chemical educational game for environmental pollution has a significant effect on improving student learning outcomes at SMPN 34 Padang, where students who study using the Ludo Kimia educational game get significantly higher learning outcomes at level 0.05 compared to students who studied without using the Ludo Chemistry educational game.

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