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Practicality and Effectiveness of Chemical Ludo Games as Learning Media of Acid and Base Materials to Students of Class XI SMA/MA

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ABSTRACT

This research is a continuation of the development research conducted by Rentia Lestari with a valid 4-D model but has not been tested for its practicality and effectiveness. The study aims to determine the level of practicality and level of effectiveness of chemical ludo games as a medium of learning of acid and base materials against student learning outcomes. The study was designed by Pretest-Posttest Control Group Design. The research objects are Class XI Mipa 1 (control class) and Class XI Mipa 2 (experiment class) at SMA N 1 V Koto Kampung Dalam. Pre-testing and posttesting. The practicality data was analyzed with the percentage of practicality and effectiveness with N-Gain. Data analysis results are practical in teachers at a very practical level and students are at a fairly practical, for the effectiveness of the data analysis results show quite effective, which is supported by an improved understanding of the learning outcomes of the higher experimental class compared to the control class. The average post-test scores of the experimental and control classes of 77.14 and 70.15 respectively and the analysis results with the N-Gain experimental class of 0.59 were at a fairly effective rate and the control class of 0.51 was at a less effective rate, the learning results of the experimental class increased than the control Class where $t_{count} (3.62) > t_{table} (1.67)$ at the real level $\alpha = 0.05$. This indicates increased learning outcomes.

1. Introduction

The concept of acidic and base matter contains factual, conceptual and procedural knowledge (Kemendikbud, 2018). Efforts to improve the mastery of the student of the factual, conceptual and procedural knowledge completed by the student then need to be done training. Exercise at the time of the learning process is understood

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as an attempt to repeat what was learned by the previous student. Based on the results of observations using the questionnaire given to teachers and students at SMA N 1 V Koto Kampung Dalam and SMA Pertiwi, information was obtained that the training given to the teacher was objective questions and essay taken from the book package used at the time of the learning process. Exercises on package books make students tend to be individual, not variable, have no competitive nature so students are less active in the work of the subject. One of the efforts that can be made to improve student activity is the use of gaming media as a learning medium for training. This is in accordance with the opinion of Falahudin (2014) efforts to improve the mastery of students related to the material of concepts, principles or procedures that have been studied require training.

According to Azhari (2015) media learning is a component of learning that has an important role in every teaching activity. One of the media that can be used is the game. A variation of the game that can be used is the chemical ludo game. Ludo is a fun, entertaining and easy to play game. (Kristiani et al., 2015). Previous research has shown that game-based learning media has a positive impact on student learning outcomes. Research conducted by Fadillah (2019) on the effectiveness of the use of chemical-edutainment (CET) based ludo game media on the material of the colloidal system against the learning results of students of class XI SMAN 3 Pariaman. This research shows that the use of chemical ludo media games is effective in improving student learning outcomes.

Currently has been available media ludo chemical game on acid and base materials developed by Rentia Lestari (2021). The media has been tested for its level of validity, but the media has not yet determined the level of practicality and level of effectiveness on student learning outcomes. Based on the above descriptions, the author is interested in determining the level of practicality and level of effectiveness of the learning media to the student's learning outcomes.

2. Methodology

This research is a continuation of research development with the research design used is Pretest-Posttest Control Group Design. The research plan is presented in Table 1.

Table 1. Rancangan Penelitian Pretest-Posttest Control Group Design

| Class | Pretest | Treatment | Posttest |
|------------|----------------|-----------|----------------|
| Experiment | O ₁ | X | O ₂ |
| Control | O ₃ | - | O ₄ |

Information :

O₁ : Early test for the experimental class

O₃ : Early test for the control class

X : Learning using media ludo chemistry

O₂ : Final test for the experimental class

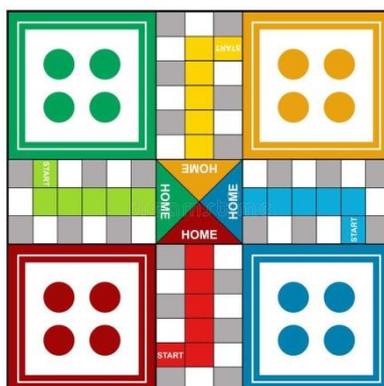
O₄ : Final test for the control class

This study was conducted in May-June 2022 at SMA N 1 V Koto Kampung Dalam. This research population is all students of class XI MIPA in at SMA N 1 V Koto Kampung Dalam second semester in the academic year 2021/2022. Sampling techniques in this study use random sampling. The sample used by the researchers there are two classes, class XI MIPA 1 which becomes a control class and class XII MIPA 2 which will be used as an experimental class.

Variable of research:

- a. The study's free variable is assisted learning in chemical play media on experimental classes and regular learning in control classes.
- b. The variables linked to this study are the learning outcomes of the students obtained from the results of the pretest and posttest performed in the experimental class and control class.
- c. This research control variable is the educator who teaches, the lesson material, the time provided and the question on the pretest and the posttest question used.

Data is a set of values that describe the characteristics of each individual present in a given population, data can be letters, numbers, images or sounds. The data used in this study is primary data. Primary data from this study is obtained from the students' learning results in the XI at SMA N 1 V Koto Kampung Dalam through the initial test (pretest) and final test. (posttest). Practicality data analysis techniques using the percentage practicality and effectiveness formula of the pre-test-posttest results performed are N-gain tests and t-tests. The chemical ludo game board is presented in Figure 1.



Picture 1. The Chemical Ludo Game

3. Results and Discussion

a. Practicality

Based on research conducted at High School N 1 V Koto Village In obtained practicality data from teachers and students. This research data is obtained through the practicality lift given to teachers and students presented in Table 2.

Table 2. Percentage of Practicality

| No | Aspect | Teacher | Student |
|----|-------------------------|---------|---------|
| 1 | Ease of Use | 92,03 % | 79,31 % |
| 2 | Efficient Learning Time | 95,23 % | 70,25 % |
| 3 | Benefit | 93,4 % | 78,42 % |
| | Average | 93,55 % | 75,99 % |

The practicality of the use of chemical learning media on base acid materials can be seen from three aspects, the first aspect of ease of use. Overall use by teachers of chemical ludo games, it belongs to the category of very practical. The ease of use by the students there are differences, which fall within the practical category. This is because there are differences in ludo games that are commonly played with the learning media ludo chemistry. This problem can be solved because students can adapt. According to Marlina & Rismawati (2019), practicality can be interpreted as ease of use.

Second, the efficiency of learning time. Teachers generally belong to a very practical category in terms of learning time efficiency. In this assessment, there is also a decrease in student ratings, this occurs because there are some students having difficulty answering questions from the game media so the use of learning time becomes less efficient, therefore students need to be guided to answer the questions so that learning time is more efficient. This is in accordance with the opinion of Kustandi and Sutjipto (2016) the use of learning media takes time in delivering content and learning messages in a considerable amount, and the probability of student absorption will be greater.

Third is the benefit. In terms of benefits, for teachers the chemical ludo game on the whole base acid material belongs to the very practical category. Student ratings fall, this is because some have not yet understood the concepts of the materials taught such as acid conjugation and conjugate base which resulted in the student's interest in learning to work on exercises becoming reduced. Ludo learning media can improve the learning performance of students from the cognitive and psychomotor realm. (Rahmadani,dkk 2021).

b. Effectiveness

Based on the research that has been done at MIPA in at SMA N 1 V Koto Kampung Dalam obtained data of student learning results on cognitive competence. This research data is obtained through the evaluation of student learning outcomes on the initial (pretest) and final tests. (posttest). The initial test is aimed at knowing the student's initial abilities. The second test is the final test (posttest) given after the meeting ends on the learning process that aims to know the student's learning outcomes after being treated. Summary averages of students' pre-test and post-test on both sample classes are presented in Table 3.

Table 3. Average pre-test-posttest sample class

| Class | N | Pretest Average | Posttest Average |
|------------|----|-----------------|------------------|
| Experiment | 28 | 35.14 | 77.14 |
| Control | 26 | 36.76 | 70.15 |

Table 3 shows the average pre-test value of the experimental class is 35.14 and the average control class is 36.76. This means that the initial skills of students in both classes are not very different. The average post-test value of the experimental class is 77.14 and the average posttest score of the control class is 70.15. This means there is an increase in student learning outcomes in the experimental class after being treated. The N-Gain test is used to identify increased student understanding and mastery of concepts that can be seen from cognitive learning outcomes before and after learning. N-Gain percentage results in experimental and control classes are presented in Table 4.

Table 4. N-Gain Learning Results

| Class | N-Gain percentage | Category |
|------------|-------------------|------------------|
| Experiment | 59% | Effective enough |
| Control | 51% | Less Effective |

Based on Table 4, the experimental class had a N-gain percentage of 59%. This means that the learning results in the experimental class are at a fairly effective level. In the control class, the N-gain rate was 51%. This means that the learning outcomes in the control class are at a less effective level. Before testing the hypothesis, the data is first analyzed through a normality test and a homogeneity test. The results of the normality test can be seen in Table 5.

Table 5. Normality test of the sample

| Variable | Mark D _{count} | Mark D _{table} | Conclusion |
|------------------|-------------------------|-------------------------|-------------------|
| Experiment Class | Pre-Test | 0.127837 | Normal |
| | Post-Test | 0.137461 | 0.24993 Normal |
| Control Class | Pre-Test | 0.15186 | Normal |
| | Post-Test | 0.130468 | 0.25907 Normal |

Table 5 shows that both classes of samples have calculated values. This test showed that the data is normally distributed, the basis for the decision-making of this normality test is using the Kolmogorov-Smirnov test if the sig value is $> 0,05$ then the data are normal distributed. (Widana, 2020). The homogeneity test results can be seen in Table 6.

Table 6. Test of Homogeneity

| Class | α | F _{count} | F _{table} | Information |
|-----------------------|----------|--------------------|--------------------|-------------|
| Experiment Control | 0.05 | 1.11 | 1.93 | Homogen |

Table 6 shows that both classes of samples have a Calculation $F_{\text{value}} < F_{\text{table}}$ at the real level $\alpha=0,05$. The result is that $F_{\text{count}} (1,11) < F_{\text{table}} (1,93)$. It can be concluded that both samples have a homogeneous variance. Based on the normality test and the homogeneity test, it is known that both classes of subjects are normally distributed and have homogeneous variants, so the hypothesis test is carried out with the t-test, as seen in Table 7.

Table 7. Testing the hypothesis

| Class | Number of Students (n) | Average (X) posttest | S ² | t _{count} | t _{table} |
|------------|------------------------|----------------------|----------------|--------------------|--------------------|
| Experiment | 28 | 77.14286 | 47.2381 | 3.625145 | 1.674689 |
| Control | 26 | 70.15385 | 52.77538 | | |

Table 7 shows that the value $t_{\text{count}} > t_{\text{table}}$ then H_0 is rejected. The test results of the hypothesis were obtained $t_{\text{count}} (3.625145) > t_{\text{table}} (1.674689)$ which showed that the study hypotheses were accepted because the sample class had differences in learning outcomes. In other words, there is a difference in learning outcomes between students who study with the media of chemical ludo games and without the media chemical Ludo games on acid and base materials in class XI in SMA N 1 V Koto Kampung Dalam.

One of the conditions that must be met to know the effectiveness of a media is that at least 75% of the student's learning outcomes are in the highest category or meet the Minimum Level Criteria. (KKM). The percentage of students enrolled in the school is 75. According to the study, the post-test data of each student in the experimental class of 21 of the 28 students reached KKM, so the percentage of succession was 75% with an average of 77,14. In the control class, only 7 of the 26 pupils reached KKM, so the percentage of performance was only 26.9% with an average score of 70.15. Sigian in Badriah (2015) stated that if the results of the activity are closer to the target, it means that the effectiveness is higher. Based on the evidence above the effectiveness of media learning is the measure of learning with the help of media in the achievement of a planned goal.

The results of this study demonstrated the learning outcomes of the highest experimental beef class than the control class due to the use of the chemical ludo game media used. Media chemical ludo games have an attractive appearance, support the role of teachers as facilitators and help students to learn independently because students can find concepts with or without teacher guidance. Implementation of learning with the learning media ludo chemistry can solve the problems presented in this research so that the hypothesis can be accepted.

4. Conclusion

Based on the research, data processing and data analysis that has been carried out on the practicality and effectiveness of chemistry games as a medium of learning acid material and base against the learning outcomes of students of class XI high

school/MA can be concluded that having a level of practicality by teachers very practical and students in the category is quite practical, the level of efficacy against the student learning outcome of 0.59 in category quite effective and can significantly improve student learning results in the cognitive sphere.

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