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# The Effect of the Lottery Card Method on Discovery Learning Assisted by Video Learning Media on Student Learning Outcomes

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**ABSTRACT**

This study aims to describe the effect of the lottery card method on student learning outcomes in acid-base solution material during video-assisted discovery learning. This study used a pre-test and post-test control group design. The study population consisted of all 247 ninth-grade students at SMA Negeri 5 Palu, across eight classes. Two classes were selected as samples, namely class XI Merdeka 5 (control) and class XI Merdeka 6 (experimental), each with the same number of 34 students, using simple random sampling. Data were collected using pre-tests and post-tests. The control class used only the discovery learning model, while the experimental class used the lottery card method in video-assisted discovery learning. From the analysis results, the N-ngai score for the control class was 0.49, and for the experimental class was 0.67, both of which were classified as moderate. Although both were moderate, the N-ngai score for the experimental class was higher than that for the control class. The t-test results showed a significance value of 0.001, which is less than 0.05, so it can be concluded that Ho is rejected and Ha is accepted. Therefore, it can be said that the lottery card method in discovery learning assisted by video media has an effect on student learning outcomes in acid-base solution material.



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## 1. INTRODUCTION

Education is a conscious and planned effort to create a learning environment [1]. Education in the 21st century prioritizes activities that enhance students' abilities, such as creativity, cooperation, critical thinking, and communication skills. Therefore, to achieve the goals of education in the 21st century, the learning process must focus on these four abilities [2].

The discovery learning model is an educational method that emphasizes active student involvement in the discovery of concepts. This method encourages students to

activate their intuition, imagination, and creativity. Students learn by being directly involved in concepts and principles, where teachers support students' interest in gaining experience and knowledge through activities, thereby increasing their curiosity to discover new ideas [3]. The steps for implementing the discovery learning model include *stimulation, problem statement, data collection, data processing, verification, and generalization* [4]. The discovery learning model, as described above, can be used as one way to address the problems occurring at Palu 5 Public High School. To take further steps in resolving these problems and improving student effectiveness through the discovery learning model, one method is to use lottery cards supported by educational video media. In the Merdeka Curriculum, Discovery Learning is expected to help students develop higher-order thinking skills and improve their creative, analytical, and synthetic thinking. This model is also expected to increase student engagement in the learning process and improve student learning outcomes [5].

The lottery card method is a teaching method similar to a raffle or social gathering. In learning activities, teachers prepare small pieces of paper, each containing questions about the material [6]. The use of lottery cards in the discovery learning model can help students develop their creativity in answering teachers' questions [7]. This lottery card method is expected to change students' perceptions that lessons are boring and uninteresting, so that, in the future, they can experience greater enjoyment and interest in the learning process. The application of the lottery card method in the discovery learning model can train students to continue innovating when answering the teacher's questions.

The application of discovery learning can be enhanced with the use of educational videos. Educational videos are a very useful tool in the learning process, especially in the field of chemistry. With clear illustrations, videos can explain complex concepts such as molecular structure, chemical reactions, and basic laws of chemistry in a more engaging and easier-to-understand way [8]. The discovery learning model assisted by educational videos has a positive effect on students' cognitive, psychomotor, and affective development. The discovery method using videos can also produce interesting video content and prevent boredom [9]. The use of videos helps students build understanding by visualizing processes or phenomena that are difficult to imagine through verbal explanations alone. Thus, the combination of active learning approaches and audiovisual media has been shown to increase attention, motivation to learn, and in-depth understanding of concepts, ultimately contributing to improved learning outcomes [10].

Learning outcomes are skills or abilities in cognitive, affective, and psychomotor aspects that students acquire through their involvement in teaching and learning activities. Learning outcomes can also be defined as changes in student behavior resulting from the learning process [11]. According to Bloom, the “learning domain” is divided into three categories, or domains, namely: the cognitive domain, which relates to brain capacity and logical thinking. The cognitive domain consists of six levels, generally grouped into two categories: basic and higher. Basic cognitive levels include memory, comprehension, and application. Higher cognitive levels include analysis, synthesis, and evaluation. Gradually, these levels are known as C1, C2, C3, C4, C5, and C6 [12].

## 2. METHOD

### 2.1 Research Design

The research applied was quantitative, using experimental methods. The research design used a pretest-posttest control-group design. There were two research groups: the experimental and the control [13].

Table 1. Pre-test Post-test Control Group Design[14]

| Class | Pre-test | Treatment | Post-test |
|---|---|---|---|
| Exsperiment (A) | $O_1$ | $X_1$ | $O_2$ |
| Control (B) | $O_3$ | $X_2$ | $O_4$ |

Description;

| | | |
|---|---|---|
| $X_1$ | = | Treatment using the lottery card method in discovery learning models using video media |
| $X_2$ | = | Treatment using the discovery learning model |
| A | = | Class Experiment |
| B | = | Class Control |
| $O_1$ , $O_3$ | = | Pre-test scores for independent class 5 and independent class 6 |
| $O_2$ , $O_4$ | = | Merdeka 5 post-test scores and Merdeka 6 class |

### 2.2 Research Location, Population, and Sample

The research will be conducted in class XI of SMA Negeri 5 Palu, Jl. R.E Martadinata, Kelurahan Tondo, Kecamatan Mantikulore, Kota Palu, Provinsi Sulawesi Tengah. The population in this study comprises all students in class XI of SMA Negeri 5 Palu, with eight classes totaling 247 students. The sampling technique in this study is probability sampling, specifically simple random sampling. Simple random sampling is a method for selecting samples from a population at random, so that each member of the population has an equal chance of being selected [15].

### 2.3 Variables (Independent and Dependent), Data Types, and Sources

The independent variable in this study is the lottery card method in the discovery learning model. The dependent variable in this study is student learning outcomes. The data obtained from this study consist of test results on student learning outcomes from two research samples, in the form of pre-tests and post-tests. The data source is primary test results, consisting of pre- and post-test assessments of student learning outcomes.

### 2.4 Instrumen

This tool consists of a written test comprising 15 multiple-choice questions: a pre-test (initial test) and a post-test (final test). The pre-test is given at the beginning of the learning process to evaluate initial or basic knowledge, while the post-test is given at the end to assess the understanding gained. Before use, this tool must first be validated by experts.

The formula used to determine the percentage test of the instrument's validity [16]. The validity test formula is the percentage of validity of the validator's assessment results:

$$Va = \frac{Tse}{Tsh} x100\% \quad (1)$$

Description:

Va = Expert validity

Tse = Total expected maximum score

Tsh = Total empirical score (Validation and validator results)

Table 2. Test Validation Criteria [17]

| Percentage (%) | Criteria |
|---|---|
| 85-100 | Very Good |
| 70-84 | Good |
| 55-69 | Fair |
| 40-54 | Poor |
| 0-39 | Very Poor |

**2.5 Data Collection Techniques and Data Analysis Techniques**

The data collection technique used in this study was a multiple-choice test. Correct answers were scored 1 point, and incorrect answers were scored 0 points. After the test, the students were divided into five groups in both classes. The experimental class used the lottery card method in discovery learning, assisted by video media and worksheets. Meanwhile, the control class only used the discovery learning model. The scores obtained are then converted into values using the formula;

$$\text{Value} = \frac{value\ obtained}{ideal\ value}\ x\ 100\% \quad (2)$$

Table 3. Knowledge Score Criteria [18]

| No | Value | Criteria |
|---|---|---|
| 1 | 85-100 | Very Good |
| 2 | 75-84 | Good |
| 3 | 65-74 | Fair |
| 4 | 50-64 | Poor |
| 5 | 0-49 | Very Poor |

According to Hake [19], the magnitude of the increase (g) is calculated using the formula normalized gain = g, namely

$$g = \frac{posttest\ score - pretest\ score}{maximum\ score - pretest\ score} \quad (3)$$

The normalized N-gain levels for mtnyatakan indicate an increase in conceptual understanding and criteria as follows:

Table 1. N-Gain outcome criteria [20]

| N-gain Value | Category |
|---|---|
| > 0,7 | High |
| 0,3 < (N-gain) < 0,7 | Medium |
| (N-gain) < 0,3 | Low |

Inferential statistical tests include parametric and nonparametric analyses. Parametric analysis is applied when population information is available, and the data meet the assumptions of normality and homogeneity. Meanwhile, nonparametric analysis is used when no information about the population is available or when the data do not meet the assumptions of normal and homogeneous distribution [21].

The normality test in this study used the Kolmogorov-Smirnov test [22]. Several reasons for this decision are:

- If the p-value is >0.05, the data are normally distributed.
- If the significance value is <0.05, then the data is not normally distributed.

To test homogeneity in this study, the researcher used the SPSS application to apply the Levene test [23]. Several reasons for the decision were:

- If the significance value based on the mean > 0.05 = Ho is accepted (data is homogeneous)
- If the significance value based on the mean < 0.05 = Ha is accepted (data is not homogeneous)

If the requirements cannot be met, nonparametric testing is performed using the Mann-Whitney test [24]. The criteria for hypothesis testing using SPSS are:

- If the significance value (2-tailed) > 0.05, then H0 is rejected and Ha is accepted.
- If the significance value (2-tailed) < 0.05, then H0 is accepted and Ha is rejected.

## 3. RESULTS AND DISCUSSION

This study aims to determine the effect of the lottery card method on student learning outcomes in chemistry within the video-assisted learning model at SMA Negeri 5 Palu. The data collected during the study consisted of pre- and post-tests of student learning outcomes in both the control and experimental classes. The results of the lesson plan (RPP) validation data showed a score of 93.3%. The results of the student worksheet (LKPD) validation data showed a score of 91.6%. The results of the test instrument validation data showed a score of 94.3%. The validation instruments have been validated by experts and are considered valid for use in the classroom.

### 3.1. Results

The cognitive learning outcomes were obtained from pre-test and post-test data in the form of 20 multiple-choice questions. The results obtained were as follows:

Table 5. Student Pre-test and Post-test Results Data

| Description | Control | | Exsperimental | |
|---|---|---|---|---|
| | Pre-Test | Posttest | Pre-Test | Posttest |
| Sample | 34 | 34 | 34 | 34 |
| Lowest Value | 6.66 | 46.66 | 13.33 | 46.66 |
| Highest Value | 60 | 93.33 | 66.66 | 100 |
| Average score | 36.46 | 67.44 | 40.19 | 79.40 |
| Standard Deviation | 13.25 | 13.90 | 13.07 | 13.66 |

Based on Table 5, the pre-test experimental class has an average score of 40.19, a minimum of 13.33, a maximum of 46.66, and a standard deviation of 13.07. Meanwhile, the increase in learning outcomes in the post-test experiment had an average score of 79.40, a minimum of 46.66, a maximum of 100, and a standard deviation of 13.66. The pre-test control class had an average score of 36.46, a minimum of 6.66, a maximum of 60, and a standard deviation of 13.25. Meanwhile, the improvement in learning outcomes in the post-test control group had an average score of 67.44, a minimum of 46.66, a maximum of 93.33, and a standard deviation of 13.90.

The results of the N-gain calculation for the experimental and control groups are shown in Table 6.

Table 6. N-Gain Calculation Results

| Class | Pre-test | Post-test | N-ngain | Category |
|---|---|---|---|---|
| XI Independence 5 (Control) | 36.46 | 67.44 | 0.49 | Medium |
| XI Independence 6 (Experiment) | 40.19 | 79.40 | 0.67 | Medium |

The normality test in this study used the Kolmogorov-Smirnov test in SPSS. If the significance value is > 0.05, the data are normally distributed; if it is < 0.05, the data are not normally distributed. See Table 7.

Table 7. Normality Test Results

| Class | Normality Test | |
|---|---|---|
| | Kolmogorov-Smirnov | Shapiro-Wik |
| Control Class | 0.089 | 0.132 |
| Experimental Class | 0.200 | 0.386 |

Based on Table 7, the results from the experimental class obtained a significance value of 0.386. It can be concluded that the experimental class data is normally distributed because the significance is > 0.05. Meanwhile, the results from the control class obtained a significance value of 0.132. In the control class, the data is not normally distributed.

To test the homogeneity of this study, the researcher used SPSS and the Levene test. If the significance value based on the mean is > 0.05 = Ho is accepted (data is homogeneous), or if the significance value based on the mean is < 0.05 = Ha is accepted (data is not homogeneous). See Table 8.

Table 8. Homogeneity Test Results

| Criteria | Levene Statistic | df1 | df2 | Significance |
|---|---|---|---|---|
| Based on mean | .147 | 1 | 66 | .702 |
| Based on median | .144 | 1 | 66 | .705 |
| Based on median and with adjusted df | .144 | 1 | 65,178 | .705 |
| Based on trimmed mean | .147 | 1 | 66 | .702 |

Based on Table 8, the homogeneity test for the experimental and control classes indicates that the data are homogeneously distributed. 247

Hypothesis testing (t-test) was conducted to determine the effect of applying the lottery card method in video-assisted discovery learning on student learning outcomes. The criteria for hypothesis testing using SPSS were a significance level of < 0.05. See Table 9 below.

Table 9. T-test Results

| Class | Data | N | Significance |
|---|---|---|---|
| XI M. 5 | *Posttest* | 34 | 0,001 |

Based on Table 9, a significance of 0.001 was obtained. This value is <0.05, so $H_0$ is rejected, and Ha is accepted. It can be concluded that the lottery card method affects video-assisted discovery learning outcomes for students in class XI Merdeka 6.

### 3.2. Discussion

Student learning outcomes are divided into three levels of ability: low, medium, and high. Students in the low ability category usually score below average, have difficulty understanding the material, and require greater learning support. Students with medium ability generally have a good grasp of the subject matter, are consistently motivated to learn, and sometimes need additional guidance. High-ability students can understand material quickly, demonstrate critical and creative thinking, and learn independently with optimal results.

The learning process in the experimental class and control class was conducted using different approaches. In the experimental class, the lottery card method was applied in discovery learning combined with video media, whereas the control class used only direct learning methods and discussions. This difference in strategy can increase student motivation to participate in lessons, ultimately having a positive impact on their learning activities and outcomes [25].

The pre-test showed that the average score in the experimental class was 40.19, and in the control class, 36.46. The standard deviation of the pre-test in the experimental class was 13.07, and in the control class, 13.25. The sample testing and analysis results showed that the data obtained in the experimental class had a significance of 0.386, and the control class had a significance of 0.132; since sig > 0.005, both classes were normally distributed. The test for homogeneity had a p-value of 0.702, which is> 0.005, so the data for both classes were homogeneous. Based on these results, it can be concluded that both classes have the same initial abilities.

At the beginning of the research conducted in the experimental class, the teacher first divided the students into six groups. The students were asked to watch and observe the educational video shown by the teacher. They were given the opportunity to ask the teacher questions about the material they found difficult. Then, each group was given worksheets and teaching materials. The students answered several questions on the worksheets through group discussion. After answering the questions, the students presented their group's answers in front of the class. The students delivered the material confidently and used real examples

to explain the differences between the three theories. The presentation was structured and interactive, though some students still consulted their notes. They were able to answer additional questions well and demonstrated a good understanding of the material. The presentations showed fairly good communication skills and a deep understanding of the concepts. Group representatives will ask questions using lottery cards containing questions. At the end of the lesson, the teacher and students will summarize the day's learning outcomes.

Meanwhile, learning in the control class was conducted directly, while that in the experimental class was guided by the stages of discovery learning at each meeting. Students were given several questions about acid-base solutions, and, conversely, asked questions about them that they did not understand.

The posttest scores were obtained, with an average of 79.40 for the experimental class and 67.44 for the control class. Meanwhile, the standard deviation for the experimental class was 13.66, and for the control class, 13.90. Based on the results of the normality and homogeneity tests for each data set, the normality test indicated a normal distribution, with significance values of 0.386 in the experimental class and 0.132 in the control class. Both data sets were normally distributed. Meanwhile, the homogeneity test produced a homogeneous variance. Thus, it can be concluded that the sample conditions were the same. Then, the t-test data showed a significant result (p=0.001), which is smaller than 0.05, so H0 was rejected, and Ha was accepted. This shows that the average score of the control class was smaller than that of the experimental class. The experimental class used a learning model that increased interaction between teachers and students in the classroom during instruction. Therefore, it can be concluded that the lottery card method in video-assisted discovery learning has an effect on student learning outcomes in acid-base solution material.

Based on four previous relevant studies, the application of the discovery learning model supported by video media can significantly improve student learning outcomes. This is due to the characteristics of discovery learning, which emphasize active student involvement in independently discovering concepts, reinforced by video media as a visual tool that presents information in a concrete, interesting, and easy-to-understand manner.

## 4. CONCLUSION

Based on the results of this study, the use of the lottery card method in video-assisted discovery learning for 11th-grade students at SMA Negeri 5 Palu had a positive impact on learning outcomes in acid-base solution material. This method encouraged student activity and helped students understand abstract chemistry concepts. The results of this study can be used as recommendations for schools in implementing effective discovery learning models, especially in chemistry learning. However, this study has limitations in terms of sample size and implementation time, so it is recommended to conduct further research to test the effectiveness of this method in a broader learning context.

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