



# THE EFFECTIVENESS OF CARROM LEARNING MEDIA ON STUDENT'S LEARNING OUTCOMES IN EXCRETORY SYSTEM EDUCATION: A QUASI-EXPERIMENTAL STUDY

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## ABSTRACT

This study investigates the impact of using carrom learning media on students' learning outcomes in the SMA Angkasa Lanud Sultan Hasanuddin, Maros excretory system. The research aims to: 1) assess the learning outcomes of students taught with carrom media, 2) evaluate the learning outcomes of students in classes taught with carrom media, and 3) determine the effectiveness of using carrom learning media on students' learning outcomes. The study adopted a quasi-experimental design with a non-equivalent control group. The population included all students of class XI MIPA at SMA Angkasa Lanud Sultan Hasanuddin Maros, totaling 134 students. The Purposive Sampling Technique was used to select 68 students from two classes, 34 from the experimental group (class XI MIPA 1) and 34 from the control group (class XI MIPA 2). The research employed learning achievement tests and observation sheets as instruments for data collection. The data analysis included descriptive and inferential analyses using prerequisite tests and independent sample t-tests. The findings showed that students in the control group, taught without carrom learning media, achieved good learning outcomes with an average score of 54.32. On the other hand, students in the experimental group taught using carrom learning media, achieved very good learning outcomes with an average score of 85.17. The inferential analysis indicates a significant difference ( $t$  count = 0.001 < 0.05) between the learning outcomes of students taught with and without carrom learning media.

**Keywords:** Learning outcomes; Carrom; learning media

## 1. INTRODUCTION

Education plays a crucial role in the rapid development of every country, as it replaces poverty with prosperity (Raharjo, 2012). By prioritizing education, progressive nations provide individuals with a stepping stone toward success, leading to effective learning methods that ensure comprehension and achievement of learning objectives (Nurkholis, 2013).

Currently, diverse learning media are being created and developed, including traditional games like the carrom board. This game directs and challenges students, enhancing their strategic thinking skills. Integrating such games into the learning process is beneficial, as it prevents classroom boredom, facilitates learning through playful engagement, and improves academic outcomes. However, games in learning activities necessitate monitoring and supervision to hinder disruptions in the classroom environment.

During an interview on January 7, 2022, HS, a biology teacher, emphasized the significance of utilizing learning media. She highlighted that the lecture method often leads to student disengagement, especially in complex topics like the excretory system with intricate images. Furthermore, many students lack in the school's Minimum Competency Criteria (KKM) set at 75.

It is crucial to have inventive and cutting-edge learning resources to tackle the difficulties associated with passive learning and meet the requirement for efficient strategies and media selection. Games, as a component of learning media, can enhance student participation and motivation. Engaging in activities that offer enjoyment, enrich experiences, and encourage exploration and interaction play a pivotal role in motivating students (Subhan, 2016). When the subject matter is delivered interestingly through visual and game-based systems, students become more engaged and active in their learning (Salmawati et al., 2019).

Considering these challenges, the carrom board media is expected to enhance student learning outcomes. By transforming learning into a competitive game guided by the card (Umar, 2017), students can participate in enjoyable activities without feeling pressured. Consequently, the carrom board media may improve students' understanding of the excretory system and their overall learning achievements.

## 2. METHODS

This research was quasi-experimental. Experimental research is conducted to determine whether or not certain treatments influence changes in certain conditions. (Suthon, 2014). In a quasi-experiment, subjects or participants are not randomly chosen

to be involved in the control or experimental group (Punaji, 2015). It can be said that a quasi-experiment is a research design that resembles an experiment but lacks the random assignment of participants to different conditions or groups. Although quasi-experiments do not provide the same level of control as true experiments, they can still provide valuable insights into causal relationships between variables.

The instruments used were learning outcome tests, lesson plans (RPP), and observation sheets that two experts validated. The data analysis used the Aiken index by Heri Renawati (2016).

$$V = \frac{\sum s}{n(c-1)}$$

Note:

- V: rater agreement index on item validity;  
 s: the score assigned by each rater minus the lowest score in the category used ( $S = R - L_o$ , with  $r =$  lowest score in the scoring);  
 n: the abundance of raters;  
 c: the number of categories that the rater can choose from

Table 1. The criteria for assessing students' academic proficiency

<b>Completeness Presentation</b>	<b>Category</b>	<b>Score</b>
80 - 100	Excellent	5
60-80	Good	4
40-60	Enough	3
20-40	Less	2
≤ 20	Very lacking	1

Inferential statistics were used in data processing to analyze sample data addressed to the population used in concluding by testing research hypotheses using t-tests. But before that, it is necessary to do a normality test as a prerequisite test:

### 1. Normality Test

Data normality tests are carried out to determine whether the data is normally distributed. To be able to carry out the test, we can use the Shapiro-Wilk test. The normality test uses the Shapiro-Wilk test if observations or samples are < 50 respondents. The normality test was carried out in this study using the Software Statistical Product and Service Solution (SPSS version 27) program. The criteria for

testing normality with SPSS processed results are that if the p-value > significance level of 0.05 ( $p < 0.05$ ), then the assumption of data normality is not met or data from normally distributed populations is not met (Victor Trismanjaya Hulu dan Taruli Rohana Sinaga, 2019).

## 2. Homogeneity Test

The homogeneity test was carried out to determine whether the data of both groups came from the same population. In order to find out the homogeneity test, the F test is used with the formula, namely:

$$F = \frac{\text{largest variance}}{\text{smallest variance}} \quad (\text{Sugiono, 2016})$$

The test criteria are a homogeneous population if  $F_{\text{calculate}} < F_{\text{table}}$  and an inhomogeneous population if  $F_{\text{calculate}} > F_{\text{table}}$  at a real level with  $F_{\text{table}}$  obtained from the F distribution table with degrees of freedom  $dk = (n_1 - 1; n_2 - 1)$  respectively according to the numerator  $dk$  and denominator  $dk$  at the level of  $\alpha = 0.05$ .

## 3. Test The Hypothesis

Statistical hypotheses can describe the state of a population or as a benchmark to be tested for correctness from the statistical research sample data obtained. That is, estimates or conjectures about a population can be seen from the sample data obtained (Sugiono, 2016).

Test the hypothesis of this study using a t-test on an independent table (independent sample t-test). The hypothesis is:

$$H_0 \quad : \mu_1 = \mu_2$$

$$H_1 \quad : \mu_1 \neq \mu_2$$

Note:

$H_0$ : There is no influence of the use of carrom media on the learning outcomes of class XI students on the Excretory System material at SMA Angkasa Lanud Sultan Hasanuddin.

$H_1$ : There is an influence of the use of carrom media on the learning outcomes of class XI students on the Excretory System material at SMA Angkasa Lanud Sultan Hasanuddin.

$\mu_1$ : The average learning outcomes taught by the use of carrom media on the learning outcomes of class XI students on the Excretory System material at SMA Angkasa Lanud Sultan Hasanuddin.

Test the hypothesis in this study using the Statistical Product and Service Solution (SPSS version 25) software program. The menu used was an analyze-compare means-independent samples t-test (Duwi Priyatno, 2010).

The research hypothesis was tested with the following testing criteria:

- 1) If  $t_{\text{count}} > t_{\text{table}}$  then  $H_0$  is rejected and  $H_1$  is accepted, meaning that there is a significant influence on the influence of the use of carmbol media on the learning outcomes of class XI students on the Excretory System material at SMA Angkasa Lanud Sultan Hasanuddin.
- 2) If  $t_{\text{count}} \leq t_{\text{table}}$  then  $H_0$  is accepted and  $H_1$  is rejected, meaning that there is no influence of the use of carrom media on the learning outcomes of class XI students on the Excretory System material at SMA Angkasa Lanud Sultan Hasanuddin.

### 3. RESULTS AND DISCUSSION

Based on the results of the descriptive analysis of Table 2 below, it can be seen that the average pretest score obtained by class XI MIPA 1 students' is 47.17 with a maximum value of 54, a minimum value is 32, a standard deviation is 6.022 with a variance value of 36.271. While the average post-test score obtained by students is 85.17 with a maximum value of 100, the minimum value is 75, and the standard deviation is 6.161 with a variance of 37.968.

Table 2. Pretest and Post-test Analysis of Experimental Class MIPA 1

Parameters	Pretest Scores	Post-test Scores
Maximum value	54	100
Minimum value	32	75
Average	47,17	85,17
Standard deviation	6,022	6,161
Variance	36,271	37,968

Based on Table 3, the distribution of pretest values of experimental class students can be obtained based on frequency distribution categories. There are 5 people with less categories and 29 people with enough categories. While the distribution of post-test scores of student learning outcomes was obtained by 7 people with good categories and 27 people with very good categories.

Table 3. Academic Proficiency Assessment Criteria

Completion Presentation	Pretest Frequency	Post-test Frequency	Category
80 -100	0	27	Excellent
60 – 80	0	7	Good
40 - 60	29	0	Enough
20 - 40	5	0	Less
≤ 20	0	0	Very lacking

The frequency distribution data of the experimental class academic proficiency assessment criteria can be illustrated in the following criteria diagram:

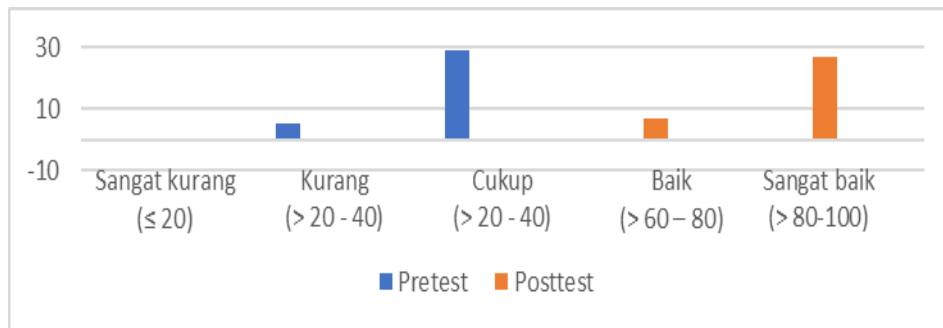


Figure 1. Criteria for Assessing Academic Proficiency Pretest and Post-test Class XI MIPA 1

Based on Figure 1 above, it can be seen that the distribution of pretest learning outcomes test data for students in experimental class XI MIPA 1, is in the range of 20-40 values as many as 5 people with less categories and in the range of 40-60 values as many as 29 people with sufficient categories. While the distribution of post-test learning outcomes tests data for students is in the range of 80-100 values with as many as 27 people with very good categories and in the range of 60-80 values with as many as 7 people with good categories.

a. Normality Test

The normality test results can be seen in the following table:

Table 4. Learning Outcomes Normality Test Results

Class	Statistics	Shapiro-Wilk		Information
		Df	Sign	
Pretest	0.974	34	0,586	

experiments				
Posttest	0,958	34	0,215	Normal Distributed
experiment				
Pretest control	0,957	34	0,202	
Posttest	0,987	34	0,948	
control				

Based on Table 4. the results of the analysis using the Shapiro-Wilk test with the help of the Statistical Product and Service Software program (SPSS version 27) on the experimental group data (XI MIPA 1) obtained a sign value of 0.586 in the pretest and post-test the sign value of 0.215, while the value of  $\alpha = 0.05$ . This indicates that  $\text{sign} > \alpha$ , means that the learning outcome data for the experimental class is normally distributed. The results of the analysis for the control class (XI MIPA 2) obtained a sign value of 0.202 and the post-test with a significant value of 0.948, while the value  $\alpha = 0.05$ , which means that the data is normally distributed. So, the data from both classes, are normally distributed.

#### *b. Homogeneity Test*

The results of the homogeneity test can be seen in the following table:

Table 5. Test Results of Homogeneity of Experimental and Control Classes

<b>Levene Statistic</b>	<b>Df1</b>	<b>Df2</b>	<b>Sign</b>	<b>Information</b>
0,131	1	66	0,719	Homogen

Based on Table 5, the results of the homogeneity test analysis using the Statistical Product and Service Solution (SPSS version 27) software program obtained a sign value of 0.719 while an  $\alpha$  value of 0.05, so the sign value  $> \alpha$ . This means that both groups come from homogeneous populations.

#### *c. Test the hypothesis*

The results of the hypothesis test in this study are as follows:

Table 6. Results of the Learning Outcomes Data Hypothesis Test

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sign	T	Df	Sign (2-tailed)
Equal variances assumed	1,338	0,252	17,686	66	0,001
Equal variances non assumed			17,686	61,636	0,001

A study is said to have a proven hypothesis if the significant value is smaller than 0.05 (sign < 0.05), where H<sub>0</sub> is rejected and H<sub>1</sub> is accepted. Table 6 shows that the significant value in the hypothesis test using the Software Statistical Product and Service Solution (SPSS version 27) program obtained the sign value (2-tailed) = 0.001. So that the hypothesis in this study can be said to be proven because 0.001 < 0.05 or by looking at the t count of 17.686 while the t table is 1.668 thus t count > t table. This means a significant difference exists between the learning outcomes of students taught using carromic learning media. This shows an influence on the use of carrom learning media on the learning outcomes of grade XI students of SMA Angkasa Lanud Sultan Hasanuddin, Maros Regency.

In this study, researchers measured the learning outcomes of students in experimental and control classes. The experimental class is class XI MIPA 1 which is taught using carromic learning media, while the control class is class XI MIPA 2 which is taught without using carrom learning media.

### *1. Learning Outcomes of Students Taught Without Using Carrom Learning Media*

In this study, the researcher referred to the criteria for assessing academic achievement to calculate the learning outcomes of students who were not taught using learning media. Based on these categories, there are 8 people in the good category with a percentage of 23%, and there are 25 people in the moderate category with a percentage of 73%. As well as an average value of 54.32, which is in the sufficient category. Based on the results of this study, in general, it can be said that the achievement of learning outcomes for students in the control class has increased when compared to the results of the pretest carried out; however, this increase has not yet reached the Minimum Completeness Criteria (KKM) value of 75. According to the results obtained in the control class, it shows that learning is good but not maximal because the teacher tends to give brief material and then instructs them to work on quiz questions. Meanwhile, according to Yunita Asisnigtyas and Suryanti, some of the weaknesses in using carrom media in the learning process were that some students did



not understand the procedure for using carrom media, and this was what became some of the obstacles (Asisingtyas, 2017).

## *2. Learning Outcomes of Students Taught Using Carrom Media*

The learning outcomes of students taught using carrom learning media, researchers refer to academic proficiency assessment criteria. Based on these categories, there are 27 people in the very good category with a percentage of 79%, and there are 7 people in the good category with a percentage of 20%. As well as an average score of 85.17%, which is very good. Based on these data, it can be concluded that the learning outcomes of students taught using carrom learning media are very good.

Student learning outcomes have increased because learning using multimedia encourages students to be active in learning. This can be seen from the number of students who get very good grades in the learning process. This is because the use of carrom media is presented using questions under the learning objectives and interestingly through the game system to improve student learning outcomes in the excretory system material. Following Van den Akker's theory in Haviz, which states that learning media is said to be effective if researchers provide results that are under the learning objectives shown by the learning outcomes of students (Haviz, 2013), In line with Sara De Freitas and Martin's statement that games in the learning process are classes, both formal and informal classes can support the learning process, help increase high-level cognitive development, and increase motivation for learning (Sara and Martin, 2006).

## *3. The Effect of Using Carrom Learning Media on Student Learning Outcomes*

The hypothesis test in this study was used to be able to see the difference in post-test scores of the experimental class (XI MIPA 1) and the control class (XI MIPA 2) based on the results of independent sample t-test analysis, which obtained sig values (2-tailed) of 0.001. This indicates that the value of sig. (2-tailed), so it can be concluded that H0 is rejected and H1 is accepted. This means that there is a significant influence on the learning outcomes of students taught with the use of multimedia learning media. The use of carrom learning media by students, where students are more enthusiastic when implementing carrom learning media, makes them more active in learning so that understanding of the material learned and learning outcomes also increase.

The use of carom learning media, which is packaged attractively, makes students more enthusiastic about learning biology. This is in line with what Sara De Freitas and Martin said: games in the learning process in class, both formal and informal, can accelerate the learning process, helping to increase high-level cognitive development and increase motivation in learning (Sara Defi, 2006). Besides that, games have a

positive impact on learning, namely: (1) improving student learning outcomes in both cognitive, affective, and psychomotor aspects; (2) overcoming learning problems such as daring to make decisions, being able to work together, and being able to think critically in solving problems in the learning process; and (3) making it easier for students to understand the learning context (Rosalina et al., 2011). Learning with a game system has a good impact on increasing motivation, interest in learning (Aini, 2018), learning effectiveness (Faisal and Sasmita, 2014), and learning outcomes (Ni Made, 2018). The integration of games into learning will have an impact on increasing students' interest and learning motivation to trigger curiosity and then continue with exploratory activities, deepen the learning activities they are doing, practice cooperation, and share opinions in discussion activities to improve results. student learning (Komang, 2020).

Based on this, researchers can conclude that using carrom learning media effectively improves the learning outcomes of grade XI students at SMA Angkasa Lanud Sultan Hasanuddin Maros Regency.

## **CONCLUSION**

Based on the research findings, the following conclusions can be made. When carrom learning media was used to teach class XI SMA Angkasa Lanud Sultan Hasanuddin Kab. Maros, students achieved an average score of 85.17, indicating very good learning outcomes. This suggests that carrom learning media is effective in the learning process. On the other hand, students who were not taught using carrom learning media in the same class achieved an average score of 54.32, indicating less effective learning outcomes. The analysis of the learning outcomes for class XI SMA Angkasa Lanud Sultan Hasanuddin Kab. Maros, with a significance level of  $\alpha = 0.001 < 0.05$ , led to the rejection of the null hypothesis ( $H_0$ ) and the acceptance of the alternative hypothesis ( $H_1$ ). This indicates that carrom learning media significantly influences student learning outcomes.

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