THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

A. Wenny Wardani[1], Yusri Handayani[2], Rezkawati Saad[3]

[1,2,3]Physics Education, Faculty of Teacher Training and Education, Muhammadiyah

University of Makassar, Indonesia

E-mailandiwenny481@gmail.com

ABSTRACT

This study aims to describe the Cognitive Learning Outcomes of students with learning media assisted by the Doodly application, describe the Cognitive Learning Outcomes without using learning media assisted by the Doodly application, and analyze the effect of learning media assisted by the Doodly application on the Cognitive Learning Outcomes of students in class XA and class XB. The type of research used is Quasi Experimental research. The Cognitive Learning Outcomes of class XA students who use learning media assisted by the Doodly application obtained an average value of 64.99 and class XB without using learning media assisted by the Doodly application (conventional learning) obtained an average value of 54.8. Based on the data analysis that has been done that in the initial test (pretest) given to students shows that the hypothesis test value Sig. (2-tailed) is $0.168 > 0.05$ which means that the Cognitive Learning Outcomes of both classes are the same. Meanwhile, after being given different treatments between the two classes, namely using learning media assisted by the Doodly application in class XA and without using learning media assisted by the Doodly application (conventional learning) in class XB, it shows a Sig. (2-tailed) value of $0.016 < 0.05$, which means there is a difference in the two classes so it can be concluded that there is a significant influence on students' Cognitive Learning Outcomes. Implications for the development of physics education can be a reference for integrating learning with digital media.

Keywords: Cognitive Learning Outcomes, Doodly Application, Learning Media, Newton's Laws

INTRODUCTION

Education is the primary foundation for individual success because it directly influences the direction and quality of one's future. As a dynamic, lifelong learning process, education reaches all levels of society and continues to develop synergistically with advances in science and technology.

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

57

The goals of education reflect good, noble, and righteous values as the foundation for a quality life. Therefore, a thorough understanding of educational goals is crucial for educators to effectively direct educational activities and achieve desired outcomes. A lack of understanding of educational goals can lead to errors in educational implementation, so it is crucial for educators to understand and internalize these goals (Umar, 2013).

Physics, as a branch of natural science, requires adequate facilities and infrastructure to support an effective learning process. Learning physics will be more meaningful if the material can be connected to everyday phenomena. Therefore, the presentation of science in each educational unit needs to be adapted to reflect the latest developments, one way of doing this is through the use of application-assisted learning media that can enhance understanding and relevance of the material.

In this era of globalization, developments in information and communication technology have had a significant impact on various aspects of life, including education in Indonesia. Advanced technology has influenced nearly every field, from politics and economics to law, culture, art, and education. In the educational context, advances in information and communication technology have driven innovation in the development of more engaging and communicative learning media. Teachers can now utilize the internet to search for or develop diverse learning media, beyond the resources provided by schools. This allows for the presentation of learning materials that are more optimal and relevant to students' needs. To achieve this, teachers are required to be creative and innovative in selecting appropriate methods, approaches, and media for presenting material. Furthermore, mastery of learning media techniques is also crucial for developing effective learning strategies and improving the quality of learning.

The use of interactive learning media is in line with the 2013 Curriculum, which encourages the integration of information and communication technology into the learning process. Research conducted by Hayati, Budi, and Handoko (2015) found that the application of learning media to physics materials has been shown to improve learning outcomes. Another study by Suradnya, Suyanto, and Suana (2016) also showed that interactive learning media can help students understand abstract concepts that are difficult to visualize, making it an effective support tool both in classroom learning and as a means of independent learning. Thus, interactive learning media can facilitate better conceptual understanding and have a positive impact on students' conceptual mastery, as supported by the research findings of Gunawan, Harjono, & Sutrio (2015) and Husein, Herayanti, & Gunawan (2019).

This ever-evolving learning media is designed to encompass systematic and engaging learning materials, boundaries, methods, and evaluations, with the goal of achieving comprehensive competency or sub-competency targets. According to Lestari (2013), this learning media or learning material is structured to support the learning process. Furthermore, Schunk (2012) also emphasizes that learning media functions to provide students with

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

58

information about the theoretical principles, concepts, and findings being studied. In its implementation, this concept-based learning media places a focus on students' cognitive development, supporting a constructive approach that encourages them to actively seek, build, and modify their knowledge and skills.

Educational media facilitates the transmission of learning content from educators to students. According to Sudjana and Rivai (2017), learning media are teaching tools integrated into methodological components to create a structured learning environment that can be guided by teachers. This view aligns with the definition put forward by Suryani et al. (2018), who define learning media as various tools and methods used to convey information in accordance with learning theory. These media are designed to facilitate learning by conveying messages, stimulating thoughts and feelings, attracting attention, and motivating students to engage in a directed and controlled learning process.

According to research conducted by Riskawati (2021), student learning outcomes in many schools currently show concerning results. This is influenced by various factors, including ineffective learning strategies and declining student interest in learning. Based on interviews with junior high and high school students, it was found that nearly 85% of them preferred using their mobile phones rather than reviewing lesson material at home. This condition causes students' understanding to decline, which directly impacts their learning outcomes. These findings highlight the importance of evaluating learning strategies and the use of technology to improve student interest and learning outcomes.

Interviews with physics teachers at Bulukumba State Senior High School 11 revealed that the school's learning process still relies on lectures and limited learning media, such as PowerPoint. Simple learning media like PowerPoint discourage students and make them struggle to solve physics problems, as they lack a simple interface and lack interactive features. The infrequent use of application-assisted learning media is due to teachers' limited time to develop more innovative tools. Consequently, learning becomes less engaging for students, leading to lower motivation in participating in the lessons. This contributes to students' difficulty in remembering formulas and solving physics problems, demonstrating the need for innovation in learning strategies and media to enhance student engagement and understanding.

The interviews revealed that one way to improve mastery and understanding of the material is through learning innovations accessible both at school and at home. Teachers can play a crucial role by providing effective and efficient learning media to increase student motivation. One type of learning media that can be used is the Doodly application. This application can be accessed via laptops, gadgets, or other devices, providing flexibility for students to learn. By using this media, it is hoped that students' cognitive learning outcomes can improve significantly.

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

59

Doodly Media is a computer application software used to create whiteboard, greenboard, or glassboard animation videos. Doodly helps create explainer videos with pre-defined templates. AP News (2021) defines Doodly as whiteboard animation software that allows anyone to use it, regardless of technical expertise or project, to design professional, effective, and original action animation videos. Doodly's advantages include ease of use, a variety of templates and assets, high customization, automatic animation, export in various formats, and suitability for various purposes.

The objectives of this study are 1) To describe the cognitive learning outcomes of students using learning media assisted by the Doodly application. 2) To describe the cognitive learning outcomes of students without using learning media assisted by the Doodly application. 3) To analyze the influence of learning media assisted by the Doodly application on students' cognitive learning outcomes.

RESEARCH METHODS

This study used a Nonequivalent Control Group Design, where the experimental and control groups were not randomly selected. The Nonequivalent Control Group Design is as follows:

Table 1.
Nonequivalent Control Group Design

O_1	X	O_2
O_3	-	O_4

Source: (Sugiyono, 2018)

Information :
O_1 = Pretest score of experimental group
O_2 = Skor *Posttest* experimental group
O_3 = Pretest score of control group
O_4 = Posttest score of control group
X = The treatment given to the experimental group was:
using learning media assisted by the Doodly application.

This study used two classes: an experimental class and a control class. This design involved administering a pretest to determine the initial conditions between the experimental and control classes. This study was conducted at SMA Negeri 11 Bulukumba in the even semester of the 2024/2025 academic year, with the study population being grade 10 students.

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

60

The sample of this study consisted of students from two classes selected using the Purposive Sampling technique, which is a sampling technique with a specific purpose based on predetermined criteria. So the sample of this study was taken from class XA as an experimental class that uses Doodly application-assisted learning media and class XB as a control class using conventional learning models. The research variables used in this study are the independent variable is the Doodly application-assisted learning media applied to the experimental class and the dependent variable is the Cognitive Learning Outcomes of students.

The instrument was a test of students' Cognitive Learning Outcomes. The pretest consisted of 20 multiple-choice questions, as did the posttest, which consisted of 20 questions. These were previously validated by two physics education validator lecturers. The instrument was then tested on students, not samples. From the calculation of the validity instrument trial using the Product Moment correlation technique, 15 questions were declared valid and 5 questions were declared dropped. Furthermore, the reliability test obtained a reliability coefficient (α) of 0.767, which is in the high category. Therefore, the instrument is worthy of research. Then, the difficulty level test was conducted to identify whether the questions were good questions. Of the 15 questions, 3 were included in the easy category, 11 were included in the medium category, and 1 was included in the difficult category. Meanwhile, the discriminating power of a question is the ability of a question to differentiate between students who are clever (master the material) and students who are less clever (less/not mastering the material), namely out of 15 questions, 4 questions have good discriminating power, 10 questions have sufficient discriminating power, and 1 question has poor (bad) discriminating power.r_{11}

Data analysis used descriptive analysis and inferential analysis consisting of normality tests, homogeneity tests and hypothesis tests.

RESULTS

This study used an experimental class and a control class, each consisting of 35 students. The experimental class used learning media assisted by the Doodly application, while the control class used conventional learning. Data were collected through pretests and posttests with a Cognitive Learning Outcomes test instrument in the form of multiple-choice items that had been tested for validity, reliability, level of difficulty, and discriminatory power. This study aims to determine the effect of the use of learning media assisted by the Doodly application on students' Cognitive Learning Outcomes in the material of Newton's laws.

Descriptive Analysis

The descriptive analysis in this study was divided into two classes: the experimental class and the control class. Data collection for each class involved a pretest and posttest. The

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

61

statistical data on the cognitive learning outcomes of grade X students at SMA Negeri 11 Bulukumba can be seen in Table 2 below.

Table 2.
Descriptive Analysis of Pretest Cognitive Learning Outcomes

Category	Class	
	Experiment	**Control**
Number of samples	35	35
Average value	42.26	49.29
Standard deviation	13.18	18.90
The highest score	73	67
Lowest value	20	13
Ideal value	100	100

Based on table 2, the descriptive statistical analysis value for the pretest data of Cognitive Learning Outcomes of class X students of SMA Negeri 11 Bulukumba is obtained. In the experimental class, namely class XA, which took the pretest as many as 35 students obtained an average score of 42.26 with the highest score being 73 and students obtaining the lowest score being 20 out of an ideal score of 100. While the standard deviation in the experimental class was 13.18.

Meanwhile, for the control class in class XB, the results of descriptive statistical analysis were obtained, which was followed by 35 students, obtaining an average score of 49.29 with the highest score achieved by students being 67 and students obtaining the lowest score of 13 from the ideal score of 100. Meanwhile, the standard deviation in the control class was 18.90. The difference in standard deviation can be used to determine the distribution of data and show how close the data is to the mean value.

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
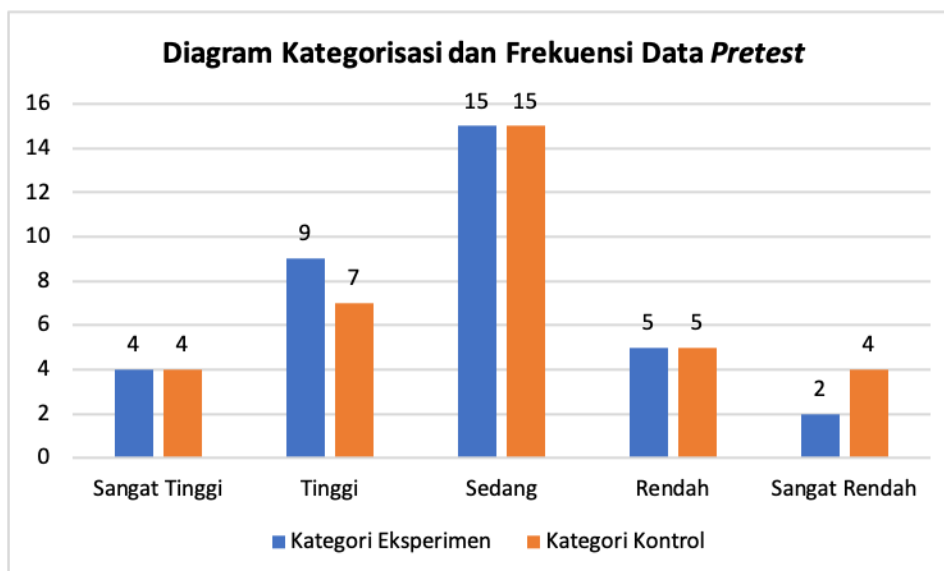ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

62

Figure 1.Value and Frequency Categorization Diagram (Pretest)

Based on Figure 1, it can be described the Level of Cognitive Learning Outcomes of class X students of SMA Negeri 11 Bulukumba between the experimental class and the control class. The very high category is the same between the experimental class and the control class, each with 4 students. Meanwhile, the high category is dominated by the experimental class with 9 students compared to the control class with 7 students. While the medium category is the same between the experimental class and the control class with 15 students. Furthermore, the low category is also the same between the experimental class and the control class with 5 students, then the very low category is dominated by the control class with 4 students and the experimental class with 2 students.

Table 3.
Descriptive Analysis of Posttest Cognitive Learning Outcomes

Category	Class	
	Experiment	**Control**
Number of samples	35	35
Average value	64.99	54.8
Standard deviation	15.00	11.10
The highest score	93	80

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

63

| Lowest value | 40 | 33 |
| Ideal value | 100 | 100 |

Based on table 3, the descriptive analysis value of the posttest data of Cognitive Learning Outcomes in class X of SMA Negeri 11 Bulukumba is obtained. In the experimental class, namely class XA, which took the posttest as many as 35 students obtained an increase from the pretest data, namely an average of 64.99 with the highest value obtained by students being 93 and the lowest value being 40, while the standard deviation was 15.00.

Meanwhile, in the control class, namely class XB, using the conventional learning model, the average score obtained was 54.8 with the highest score being 80 and the lowest score obtained being 33, while the standard deviation in the Cognitive Learning Outcomes posttest was 11.10.
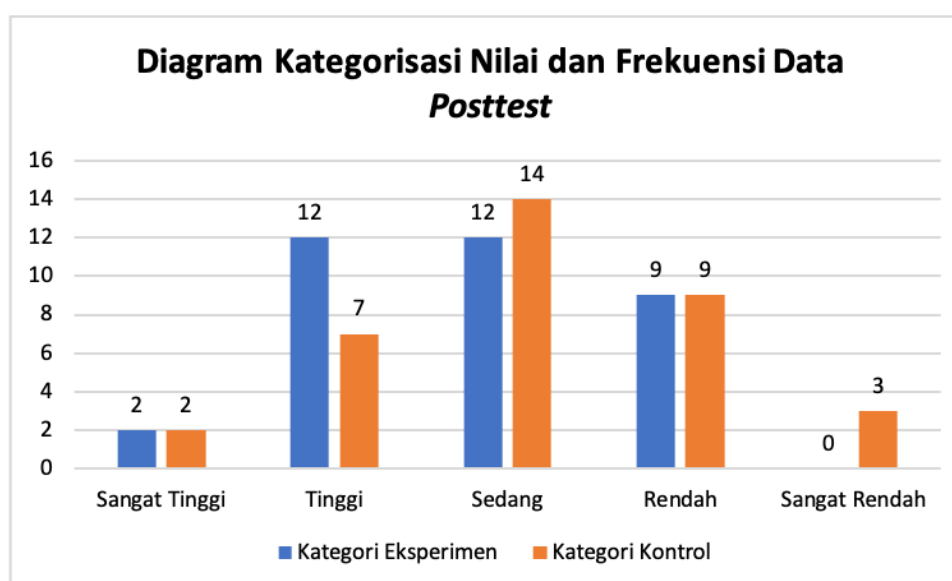

Figure 2 Value and Frequency Categorization Diagram (Posttest)

Based on Figure 2, the posttest data of Cognitive Learning Outcomes of class X students of SMA Negeri 11 Bulukumba can be seen, which shows the categorization of Cognitive Learning Outcomes of students after being given treatment using Doodly application-assisted learning media in the experimental class and conventional learning models in the control class. The very high category is the same between the experimental class and the control class, namely 2 students each. Meanwhile, the high category is dominated by the experimental class with 12 students compared to the control class with 7 students. While the medium category is dominated by the control class with 14 students compared to the experimental class with 12 students. Furthermore, the low category is also the same between the experimental class and

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

64

the control class with 9 students, while the very low category is dominated by the control class with 3 students.

Normality Test

This normality test was carried out using the Kolmogorov-Smirnov test in the SPSS application and the results of the analysis can be seen in table 4 below.

Table 4.
Normality Test

	Class	Kolmogorov-Smirnova		
		Statistics	df	Sig.
Cognitive Learning Outcomes	*Pretest*Experiment	.138	35	.090
	*Posttest*Experiment	.095	35	.200*
	*Pretest*Control	.137	35	.093
	*Posttest*Control	.137	35	.093

Based on the data in Table 4, it can be seen that the Sig. value for the experimental pretest data is Sig. 0.090 and the experimental posttest is Sig. 0.200. This indicates that the value is greater than Sig. 0.05, so it can be concluded that the data is normally distributed. Meanwhile, the pretest and posttest control data have the same Sig. value, namely Sig. 0.093, where this value is also greater than the Sig. value of 0.05 or 0.093 > 0.05, so it can be concluded that the data is also normally distributed.

Homogeneity Test

This homogeneity test was carried out using a one-way ANOVA test in the SPSS application and the results of the analysis can be seen in table 5 below.

Table 5
Pretest Homogeneity Test

Levene Statistics	df1	df2	Sig.
.143	1	68	.707

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

65

Based on the data in table 5, the Sig. value of the pretest data is 0.707, which indicates that the value is greater than Sig. 0.05 or 0.707 > 0.05, so it can be concluded that the pretest data of Cognitive Learning Outcomes of class X students of SMA Negeri 11 Bulukumba comes from a homogeneous class.

Table 6
Posttest Homogeneity Test

Levene Statistics	df1	df2	Sig.
2,689	1	68	.106

Based on table 6, the Sig. value of the posttest data is 0.106, which indicates that the value is greater than Sig. 0.05 or 0.106 > 0.05. So it can be concluded that the posttest data of Cognitive Learning Outcomes of class X students of SMA Negeri 11 Bulukumba comes from a homogeneous class.

Hypothesis Testing

The following hypothesis test is carried out after the data is normally distributed and comes from a homogeneous class using a parametric statistical test, namely the independent sample T test, which can be seen in table 7 below.

Table 7
Hypothesis Test Pretest

	Pretest	
Sig. (2-tailed)	0.168	
t-test	Sig. 2-tailed > 0.05	
Conclusion	H_0 accepted	H_a rejected

Based on the results of the hypothesis test using the SPSS application using the independent sample T test, the Sig. (2-tailed) value of the experimental pretest and control pretest was 0.168, which was greater than Sig. (2-tailed) 0.05. Thus, it was accepted and rejected, indicating that there was no significant difference in Cognitive Learning Outcomes between the experimental class and the control class before treatment. This shows that the initial conditions of the two classes were relatively equal. $H_0 H_a$

Table 8
Hypothesis Test Posttest

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

66

	Pretest	
Sig. (2-tailed)	0.016	
t-test	Sig. 2-tailed < 0.05	
Conclusion	H_0rejected	$H_a$accepted

The results of the hypothesis test using the SPSS application using the independent sample T test showed a Sig. (2-tailed) value for the experimental posttest and control posttest of 0.016, which is smaller than Sig. (2-tailed) 0.05. Thus, it was rejected and accepted, indicating that there is a significant influence of the use of the learning media on students' Cognitive Learning Outcomes.$H_0$$H_a$

DISCUSSION

The research entitled The Influence of Learning Media Assisted by the Doodly Application on Students' Cognitive Learning Outcomes in Newton's Law Material was conducted with the aim of describing students' Cognitive Learning Outcomes using learning media assisted by the Doodly application, describing students' Cognitive Learning Outcomes without using the Doodly application (conventional learning) and analyzing the influence of learning media assisted by the Doodly application on students' Cognitive Learning Outcomes.

Descriptive data analysis shows that the average pretest score of Cognitive Learning Outcomes of class XA (experimental class) is 42.26 with a standard deviation of 13.18 and a variance of 173.71. Meanwhile, class XB (control class) has an average pretest score of 49.29 with a standard deviation of 18.90 and a variance of 357.21.

The higher standard deviation of the control class compared to the experimental class indicates that the control class's mean score has greater variation. Furthermore, the higher variance of the control class indicates that the control class's score data points are more spread out around the mean, indicating greater heterogeneity in score acquisition.

Descriptive analysis of the Cognitive Learning Outcomes posttest data shows that class XA (experimental class) has an average value of 64.99 with a standard deviation of 15.00 and a variance of 225. Meanwhile, class XB (control class) has an average value of 54.8 with a standard deviation of 11.10 and a variance of 123.21.

The results of the analysis show that class XA (experimental class) which uses media assisted by the Doodly application has an average Cognitive Learning Outcome of 64.99, while class XB (control class) which uses conventional learning has an average Cognitive Learning Outcome of 54.8.

Inferential analysis using SPSS application was conducted to test the research data of pretest and posttest of Cognitive Learning Outcomes. Normality test using Kolmogorov-Smirnov test showed that the Sig. value for experimental pretest data was 0.090, experimental posttest data was 0.200, control pretest data was 0.093, and control posttest data was 0.093. Since these values are greater than 0.05, it can be concluded that the pretest and posttest data for both classes are normally distributed.

Next, a homogeneity test was conducted using one-way ANOVA in the SPSS application to determine whether the research data came from a homogeneous class or not. The

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

67

homogeneity criterion is determined if the Sig. value is greater than 0.05. Based on the results of the homogeneity test, the pretest data of the experimental class and the control class showed a Sig. value of 0.707 which is greater than 0.05, so it can be concluded that the pretest data came from a homogeneous class. Likewise, the posttest data of the experimental class and the control class, with a Sig. value of 0.106 which is also greater than 0.05, indicating that the posttest data also came from a homogeneous class.

Next, a hypothesis test was conducted on the pretest and posttest data from the experimental and control classes to determine the effect on students' cognitive learning outcomes. This hypothesis test was conducted after considering the results of prerequisite tests, namely the normality test and the homogeneity test, which determine the appropriate type of hypothesis test to use. Once these prerequisite tests have been met, the hypothesis test can be conducted to compare cognitive learning outcomes between the experimental and control classes.

The normality and homogeneity tests on the pretest data of the experimental and control classes show that the data are normally distributed and homogeneous. Therefore, the hypothesis test can be carried out using a parametric test, namely the Independent-Samples T Test. The results of the Independent-Samples T Test on the pretest data show that there is no significant difference between the Cognitive Learning Outcomes of the experimental and control classes, because the Sig. (2-tailed) value of 0.168 is greater than 0.05. This indicates that the initial Cognitive Learning Outcomes of the two classes are relatively the same.

The posttest data of the experimental and control classes have met the requirements of normal distribution and homogeneity. Therefore, the hypothesis test was conducted using the Independent-Samples T Test to determine the differences in Cognitive Learning Outcomes between the two classes. The test results showed that there was a significant difference between the Cognitive Learning Outcomes of the experimental class using Doodly application-assisted learning media and the control class using conventional learning. This is indicated by the Sig. (2-tailed) value of 0.016 which is smaller than 0.05, so it can be concluded that there is a significant influence of the use of learning media on students' Cognitive Learning Outcomes. This finding is in line with previous research, Nurita (2024) which stated that there is a significant increase in understanding in students with learning using digital-based media on physics learning outcomes.

CONCLUSION

Based on the research that has been conducted, it can be concluded that the results and discussion of the research based on the applied research objectives are as follows. 1) The level of cognitive learning outcomes of students in class XA of SMA Negeri 11 Bulukumba who were taught using learning media assisted by the Doodly application had an average cognitive learning outcome value of 64.99, which is included in the moderate category. 2) The level of cognitive learning outcomes of students in class XB of SMA Negeri 11 Bulukumba who were taught without using learning media assisted by the Doodly application had an average cognitive learning outcome score of 54.8, which is also included in the moderate category. 3) There is a significant influence of the use of learning media assisted by the Doodly application on students' cognitive learning outcomes compared to using conventional learning.

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION
ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

68

THANK-YOU NOTE

REFERENCE

Associated Press. (2021). New Study Explores the Effectiveness of Doodly in Online Learning. AP News.www.doodly.com

Gunawan, G., Harjono, A., Herayanti, L., Husein, S., & Fathoroni, F. (2019). Investigating Students Critical Thinking Disposition Based On Gender In Physics Teaching With Interactive Multimedia.*JPPS (Journal of Science Education Research)*,*9*(1), 1766-1771.

Gunawan, G., Harjono, A., & Sutrio, S. (2015). Interactive multimedia in learning electrical concepts for prospective teachers.*Journal of Physics Education and Technology*,*1*(1), 9-14.

Hayati, S., Budi, AS, & Handoko, E. (2015, October). Development of physics flipbook learning media to improve student learning outcomes. In Proceedings of the National Physics Seminar (E-Journal) (Vol. 4, pp. SNF2015-II).

Haristy, DR, Enawaty, E., & Lestari, I. (2013). Science literacy-based learning on electrolyte and non-electrolyte solutions at Pontianak 1 State Senior High School. Equatorial Journal of Education and Learning (JPPK), 2(12)

Nurfadilah, N., Putra, DP, & Riskawati, R. (2021). The impact of online learning through the educational game Quizizz on physics learning outcomes. Journal of Physics Education and Technology, 7(2), 182-189.

Nurita, L., Wathoni, M., Ismah, I., & Widyasari, N. (2024). Improving Learning Motivation Using Educaplay Educational Games on Recount Text Material for Grade X Students of SMA Muhammadiyah Ponjong. SEMNASFIP.

Sugiyono. (2018). Quantitative, Qualitative, and R & D Research Methods. CV Alphabeta.

Suradnya, LSA, Suyanto, E., & Suana, W. (2016). Interactive Module with LCDS Program for Light and Optical Instruments Material. Journal of Physics Learning, 4(2).

Schunk, D.H. (2012). Learning theories an educational perspective. Pearson Education, Inc.

Suryani, NA, Sakti, I., & Purwanto, A. (2018). Differences in Learning Outcomes Between the Clis (Children's Learning in Science) Learning Model and the Science Media Kit at SMP Negeri 21 Bengkulu City. PENDIPA Journal of Science Education, 2(1), 113-116.

Umar, H. (2013). Research methods for business theses and dissertations.Jakarta. PT Rajagrafindo Persada.

Wahidin, Sudjana U. (2017). Media-based communication interactions in the teaching and learning process.*Islamic Education: Journal of Islamic Education*,*4*(07), 197.

A. WENNY WARDANI1/ THE EFFECT OF LEARNING MEDIA ASSISTED BY THE DOODLY APPLICATION ON STUDENTS' COGNITIVE LEARNING OUTCOMES ON NEWTON'S LAWS

69