

***THE EFFECT OF LEARNING GAMES ON IMPROVING SCIENCE
LEARNING OUTCOMES***

***PENGARUH GAME PEMBELAJARAN TERHADAP
PENINGKATAN HASIL BELAJAR PEMAHAMAN ILMU
PENGETAHUAN ALAM***

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Received : November 10, 2025

Revised : November 25, 2025

Accepted : December 8, 2025

Abstract

The aim of this study is to investigate the difference in understanding learning outcomes between students who use learning games and those who do not, specifically in the subject of Natural Sciences, focusing on temperature materials and changes, among class VII students at SMP Islam Tathmainul Quluub Sindang. The research method employed is a quasi-experimental Nonequivalent Control Group Design. The study involved two classes: one served as the experimental group and the other as the control group. The experimental group was taught using learning games, whereas the control group received traditional lecture-based instruction. Both groups underwent a pretest and a posttest. The data analysis revealed that the average post-test score for the experimental group was 75.35, compared to 63.21 for the control group. The conclusion drawn from the study is that there is a significant difference in learning outcomes between students who use learning games and those who do not. Students who engage with learning games demonstrate better understanding of the subject matter than those who do not.

Keyword : *Influence, Learning Games, Learning Outcomes of Understanding*

Abstrak

Tujuan dari penelitian ini yaitu untuk menguji adanya perbedaan hasil belajar pemahaman antara siswa yang menggunakan game pembelajaran dengan siswa yang tidak menggunakan game pembelajaran pada mata pelajaran Ilmu Pengetahuan Alam materi suhu dan perubahannya kelas VII SMP Islam Tathmainul Quluub Sindang. Metode penelitian yang digunakan adalah metode kuasi eksperimen Nonequivalent Control Group Design. Penelitian ini melibatkan 2 kelas yaitu kelas eksperimen dan kelas kontrol. Kelas eksperimen diberikan perlakuan menggunakan game pembelajaran, sedangkan kelas kontrol menggunakan pembelajaran ceramah. Masing-masing diberikan pretest dan posttest. Hasil pengolahan data menunjukkan perhitungan nilai rata-rata post test dari kelas eksperimen sebesar 75,35 sedangkan kelas kontrol 63,21. Kesimpulan hasil penelitian yaitu terdapat perbedaan hasil belajar pemahaman antara kelompok yang menggunakan game pembelajaran dengan kelompok yang tidak menggunakan game pembelajaran. Hasil belajar pemahaman siswa yang menggunakan game pembelajaran lebih tinggi dibandingkan dengan kelompok yang tidak menggunakan game pembelajaran.

Kata Kunci : Pengaruh, Game Pembelajaran, Hasil Belajar Pemahaman

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PENDAHULUAN

The advancement of science and technology has had a significant impact on various aspects of human life, including the education sector (Zuhriyah, 2016). The development of science and technology in education requires teaching processes to become more innovative and engaging in delivering learning materials. Technological progress also demands that learners become creators and facilitators in the learning process (Priana, 2017).

In line with the development of science and technology, students' learning styles have changed.

Students today belong to Generation Z, commonly referred to as digital natives. According to MCCRINDEL (generationz.com.au), children of Generation Z are global, social, visual, and tech-savvy. Digital natives differ from previous generations in several ways; they have grown up with advanced digital technology, have different learning styles, and have new attitudes towards the learning process.

Learning is one of the efforts to create a learning situation that helps learners improve their abilities (Jamaludin, 2015).

In the learning process, teachers should be able to understand students' capabilities and readiness for the lessons they will deliver, as well as know the students' current conditions. Students who have the ability to understand the material they are going to learn will determine their success in mastering the lesson in class. Choosing the right teaching method can make students more active in class (Nanang, 2017).

If teachers continue to use traditional or lecture-based teaching methods, it may be difficult to engage students.

Teachers must use different teaching methods and approaches that allow learners to be active and make the learning process more effective. A learning process can be effective if it uses teaching methods and learning media that suit the learning style of the students (Pratama, 2017). Therefore, there is a need for innovation in teaching methods, such as the use of learning media, to ensure that students can understand the lessons. Learning media is a tool that serves to convey messages, thus stimulating the recipients' thoughts and interest in learning (Sadiman, 2014).

Teachers must be creative in choosing learning media. The use of learning media should be suitable for the subject being taught. Appropriate use by teachers can help instill a good understanding of the material concepts in students. Learning media can also assist teachers in achieving their teaching objectives.

The researcher conducted an observation in class VII of SMP Islam Tathmainul Quluub Sindang during the IPA subject and found that the teaching process in the classroom was primarily based on the lecture method. This approach contradicts the implementation of the Kurikulum 13, which is designed to focus on the learners rather than the teacher. The limited use of teaching media in the classroom leads to students not fully understanding the material concepts. Additionally, students often feel bored because they are required to listen to the teacher's explanations for extended periods during lessons. According to Suprijono (2009), teachers are expected to be creative in using teaching media during learning activities.

One example of teaching media is games.

According to Santoso (2019), games serve as a medium for children to gain learning experiences that support their cognitive, social, emotional, and physical development. Learning games should include challenges and motivation to make them engaging (Samsul, 2016). Games have undergone significant development since their inception (Wifda, 2015). According to Alessi & Trollip (2001), games offer various benefits in the learning environment, as they can motivate students, sometimes even encourage them to learn more, and make the learning process more enjoyable.

Learning games are a type of teaching media that uses computers and have started being used in both formal and non-formal education.

According to Ramadhan et al. (2019), learning games are applications that contain educational materials or information. These materials can be explicitly presented in multimedia applications or implicitly conveyed through the storyline within the game itself.

Using games can motivate students and make learning enjoyable when students are actively involved. One advantage of learning games over traditional media is their ability to present real-life problems (Vitianingsih, 2016). Research conducted by Malsani found that there was a positive increase in students' learning outcomes when games were used in teaching activities (Maslani, 2016).

The researcher chose the subject of Science, specifically the topic of temperature and its changes.

Many students believe that Science is not an interesting subject. Students often find it difficult to understand Science concepts because teachers usually just explain what is written in the textbook without using any engaging media. Teachers mainly act as information providers, and only important information is written on the board. As a result, students who attend class tend to become bored. Therefore, there is a need for a learning medium that can attract students' attention and encourage them to be active in class, such as learning games.

The use of learning games in the teaching and learning process can help students better understand Science concepts.

According to research, games can improve logical thinking and understanding of the subject. Nowadays, children in school age often play games. By applying games in the teaching process, it can increase students' motivation and interest in learning.

Based on the above explanation, the researcher wants to conduct a study on the influence of learning games on students' understanding of Science learning outcomes.

METODE

This study used a quasi-experimental approach. There are two types of quasi-experimental designs: Times-Series Design and Nonequivalent Control Group Design (Sugiyono, 2014). This study chose a Nonequivalent Control Group design. Subjects were divided into two predetermined groups: an experimental group and a control group.

The study was conducted on 56 seventh-grade students from SMP Islam Tathmainul Quluub Sindang in the 2019/2020 academic year, consisting of 56 students from classes VII B and VII C. The experimental group, class VII B, participated in learning using educational games. Meanwhile, the control group, class VII C, continued using conventional lecture methods. Each class consisted of 28 students. The research instruments included:

- Lesson Implementation Plan (RPP) – two versions were prepared, one for the experimental class and the control class.
- Learning Game – an adventure-style game with the goal of collecting coins and keys. Each key contains lesson material, and the final result of the game indicates the number of coins collected.
- Objective Test – multiple-choice questions to measure student understanding. The test was administered in the form of a pre-test and a post-test, each consisting of 20 questions.

The data was analyzed in two stages, namely prerequisite testing and hypothesis testing with the help of the SPSS 20 program. The prerequisite testing included normality and homogeneity tests, then continued with hypothesis testing to determine differences in student understanding learning outcomes.

HASIL DAN PEMBAHASAN

Hasil Penelitian

The results of the study showed that there was a difference in the average (mean) values of the control group and the experimental group.

Table 1. data descriptive

	Data	Control class	Experiment class
Posttest	N	28	28
	Lowest result	50	50
	Highest result	75	85
	Mean	63,21	75,35
	Median	65	75
	Deviation standard	6,27683	9,12146
	Variants	39,286	83,201

Normality Test

Normality tests were performed on both experimental and control groups using the Kolmogorov Smirnov test.

**Tabel 2. Uji Normalitas
One-Sample Kolmogorov-Smirnov Test**

		Nilai Pre Test	Nilai Pre Test	Nilai Post Test	Nilai Post Test
		Kontrol	Eksperimen	Kontrol	Eksperimen
N		28	28	28	28
	Mean	39,1071	46,0714	63,2143	75,3571
Normal Parameters ^{a,b}	Std.	8,28358	11,16850	6,26783	9,12146
	Deviation				
	Absolute	,190	,148	,184	,207
Most Extreme Differences	Positive	,150	,148	,174	,158
	Negative	-,190	-,137	-,184	-,207
Kolmogorov-Smirnov Z		1,006	,784	,971	1,096
Asymp. Sig. (2-tailed)		,263	,570	,302	,181

The experimental class obtained a significance value of 0.181 and a control class significance value of 0.302. The significance values of the experimental and control classes were higher than sig 0.05. This proves that the data is normally distributed.

Homogeneity Test

The homogeneity test uses the Homogeneity of Variance Test. The data is said to be homogeneous if the sig. value is higher than 0.05.

Post			
Levene Statistic	df1	df2	Sig.
,784	1	54	,380

From Table 3, the significance value is 0.380. This value is higher than 0.05. This proves that the data is homogeneous.

Hypothesis Test

Using the Independent Sample T-test. The test is based on the following hypothesis. H1: (There is a significant difference in learning outcomes between students who learn using learning games and students who do not use learning games) Decision criteria: If the Sig. value (2-tailed) < 0.05 then H1 is accepted.

Tabel 4. Uji Hipotesis
Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	,784	,380	-5,806	54	,000	-12,14286	2,09154	-16,33614	-7,94958
Post Equal variances not assumed			-5,806	47,849	,000	-12,14286	2,09154	-16,34852	-7,93720

Table 4 shows a significance value (2-tailed) of 0.000. A value of 0.000 is lower than 0.05. There is a significant difference in understanding learning outcomes between students who use learning games and students who do not use learning games.

PEMBAHASAN

Various efforts can be made to improve student skills, one of which is the use of games in teaching and learning activities. Research conducted by (Lestari, Widiyatmoko, Alimah, & Juliyani, 2015) shows that the use of games in the learning process can improve student skills. Learning games can capture students' attention, thus increasing their motivation to learn. Furthermore, students will be more active in participating in teaching and learning activities.

Games are an example of digital media. Digital media can be created, viewed, distributed, modified, and persisted on digital electronic devices. Digital technology offers numerous opportunities for creating engaging content (Tabor, 2013). The approach of using digital media technology as a

learning medium has a better and more effective impact than other approaches (Reeves, 1998). According to (Lee, 2015), in terms of social interaction and collaboration, the use of digital media (iPads and games) in learning centers can increase the frequency of interaction between children, both with friends and with teachers. This occurs because when they encounter new experiences (whether in the form of difficulties or solutions), they tend to communicate with their teachers and friends. Rutten, Van Joolingen, & Van Der Veen (2012) also stated that the use of digital media (computer simulations) can improve students' abilities, especially for laboratory work materials. Furthermore, there is a development of learning motivation in children because the use of digital media is interesting and fun (Lee, 2015). Kocadere & Çağlar (2015) also stated that students feel more enjoyable and motivated in learning when using digital media (games). Digital media can also effectively help put into practice several important learning theories developed (Pischetola & Cattolica, 2011)

A game is a broad concept that refers to all game structures consisting of rules, goals, and challenges designed for diversion or entertainment (Cheng, Chen, Chu, & Chen, 2015). To date, games have evolved in various ways. Currently, most people are encouraged to use games as a means of play and entertainment (Felicia & Jabbar, 2016). Many people now play games for entertainment. This can be applied to classroom teaching and learning activities. According to (De Aguilera & Mendiz, 2003), the benefits of using games in teaching and learning are undeniable. Games can stimulate motivation, train skills, enhance perception and stimulation, and develop users' problem-solving abilities. Furthermore, games can develop strategic assessment skills, organize media, and tools to arrive at intelligent answers/solutions. (Dondlinger & Dondlinger, 2007) also state that games can have a positive effect on the learning process, although there is widespread consensus that games only motivate users to master their gaming skills.

The genre of this game is adventure. This game can motivate students to learn. Using real-world settings in the game can also increase player motivation (Kahn, 2015). This game consists of several levels, each with its own level of difficulty. The difficulty of each level can motivate students to complete the challenge. (Giammarco, Schneider, Carswell, & Knipe, 2015)

stated that game players inherently have the enthusiasm and desire to complete each level and advance to the next. Students entering junior high school in Indonesia range from 12 to 14 years old. (Eccles, 1999) stated that children aged 6-14 (middle and early adolescence) are a developmental period for children to establish their identity. During this time, children prepare to move into adulthood by becoming competent, independent, and seeking to engage with the world outside their families. Changes also occur in children's biological and cognitive development. The right learning method will significantly assist a child's learning process. (Rohwati, 2012) stated that in a study conducted at SMP Negeri 1 Wonosobo, the use of educational games was proven to improve student learning outcomes and activities.

This study demonstrates the effectiveness of using a learning game in the classroom. This adventure game requires students to collect as many coins and keys as possible. Each key contains the material being studied at that time. The material used in the game is temperature and its changes.

The results illustrate a difference in learning outcomes in the understanding of students who used the learning game and those who did not use it in Grade VII SMP Islam Tathmainul Quluub Sindang. Data collection was conducted by dividing the class into two groups: a control group and an experimental group. Both classes were given a posttest. The experimental group used the learning game, while the control group used the lecture method.

The equal variances assumed column shows a t-test value of -5.806 on a df of 54 with a significance level of 0.000. Because the calculated t-value obtained is negatively distributed, the H1 criterion is accepted, with $t\text{-test} < t\text{-table}$ ($-5.806 < 2.00488$) and a significance level of < 0.05 . This means that H1 was accepted, indicating a significant difference in comprehension learning outcomes between students who used learning games compared to students who did not.

This indicates that the experimental class' comprehension learning outcomes exceeded those of the control class. This difference was due to the influence of the use of learning games in the learning process given to the experimental class, resulting in students having better comprehension learning outcomes after using learning games compared to the control class.

The analysis showed that the use of learning games resulted in the experimental class' comprehension learning outcomes exceeding those of the control class. Therefore, learning games have an effect on students' comprehension learning outcomes in the science subject, temperature and its changes, in grade VII at SMP Islam Tathmainul Quluub Sindang. It can be concluded that the use of learning games has a significant effect on students' comprehension learning outcomes. Learning games can have a positive impact on students. Furthermore, they also increase student engagement in class and improve concentration in learning. According to Maslani's research, "Improving Student Learning Outcomes and Activeness through Games," ranked first on the topic of Norms in Social Life in Class VII A of SMPN 4 Pelaihari, there has been an increase in student learning outcomes.

CONCLUSION

Based on the research results, it can be concluded that there is a difference in learning outcomes between the group that implemented the learning game and the group that did not. The learning outcomes of students who implemented the learning game were higher than those of the group that did not implement the learning game.

In addition, learning games can increase students' activity, interest and motivation in participating in learning activities.

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