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The Effect of Game-Based Learning Model on Students' Cognitive Abilities on Eclipse Material in Science Learning for Elementary Schools

Abid, Ashfa Al[1] & Fajrie, Nur[1*]

[1]Muria Kudus University, Jl. UMK North Ring, Gondangmanis, Bae, Kudus - 59327 Central Java - Indonesia

*Corresponding author email: nur.fajrie@.umk.ac.id

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Abstract: The world of education should be able to create innovation and positive change aimed at improving the quality of education. Learning can be changed from conventional learning to non-conventional learning by involving students to be more active and interactive. In this case, one realization of the transfer of learning from conventional to non-conventional is by adapting technology in the world of education. The development of increasingly sophisticated technology must be utilized in the educational environment. However, in the current era there are still many teachers who do not understand or understand the use of technology and how to apply it in the world of education. Many teachers with a learning model still use the lecture model. In fact, science learning at elementary school level must be fun and attract a lot of students' attention. In its implementation, science learning in elementary schools can really implement technology in it, so that teachers as educational staff can make it easier to deliver the material they present to students so that it is more interesting and flexible in order to improve students' cognitive abilities. Indicators are intended to measure how successful the implementation of the Game Based Learning learning model is on the level of cognitive abilities of students in grade 6 at Nganguk Elementary School. There were changes based on the pretest in the form of a questionnaire carried out before implementing the Game Based Learning learning model, the value of students' cognitive abilities was still 65% -75%, different after implementing the Game Based Learning learning model by giving a posttest in the form of a questionnaire, the value of students' cognitive abilities changed by 75% -90% with the t test assisted by the SPSS 20 application, a significance value of 0.000 <0.05 was found, so it can be concluded that there is a significant influence between before and after implementing the Game Based Learning learning model.

Keywords: Learning Model, Influence of Learning Model, Cognitive Ability

1. Introduction

Education at this time is very necessary for children in their growth and development period. With proper education, children can gain knowledge and skills to learn and be equipped to face various problems in the future. Education is also the basis for carrying out the learning process which plays a role in developing students' self-development. According to (Fitri, 2021) Education is a means or bridge for humans to be able to increase their potential through the learning process they receive. In education there is a curriculum system in it. Curriculum is a device design for subjects regarding the flow and learning plans for one period in an educational institution. In line with this, according to Arifin, quoted by (Pinton Setya Mustafa, 2020), the curriculum is all potential activities and experiences (content/material) that have been prepared scientifically, whether they occur in the classroom, on the school grounds or outside the school. on the school's responsibility to achieve educational goals.

The world of education should be able to create innovation and positive change aimed at improving the quality of education. Learning can be changed from conventional learning to non-conventional learning by involving students to be more active and interactive. In this case, one realization of the transfer of learning from conventional to non-conventional is by adapting technology in the world of education. The development of increasingly sophisticated technology must be utilized in the educational environment. All new information and knowledge can be connected easily through

*Corresponding author: nur.fajrie@umk.ac.id

technological developments easily (Nur Fajrie, 2022). Currently, technology is able to provide access for students to find material easily and quickly. According to (Salsabila, 2020) Technology was created to complete work easily and quickly. However, in the current era there are still many teachers who do not understand or understand the use of technology and how to apply it in the world of education. Many teachers with a learning model still use the lecture model. As a result, when delivering learning material in class, students quickly feel bored and students' activity points decrease, causing them to become passive in participating in learning in class. In fact, science learning at elementary school level must be fun and attract a lot of students' attention. In its implementation, science learning in elementary schools can really implement technology in it, so that teachers as educational staff can make it easier to deliver the material they present to students so that it is more interesting and flexible in order to improve students' cognitive abilities.

According to (Nur Fajrie, 2021), cognitive ability is the ability to think abstractly in humans as a form of adapting to the environment by processing information obtained through the senses to produce work. Meanwhile, according to (Basri, 2018) cognitive abilities are brain-based skills that are needed to carry out any task from the simple to the most complex. So the conclusion of this cognitive ability is an ability within students that involves the brain to think abstractly by processing information obtained through the senses to produce work and carry out any task from the simple to the most complex. In this cognitive ability, there are indicators in the realm of cognitive competence according to (Rahmawati, 2018) which are as follows: remembering or memorizing, understanding, applying and analyzing. This indicator is intended to measure how successful the implementation of the Game Based Learning learning model is on the level of cognitive abilities of students in grade 6 at SD Nganguk. The Game Based Learning learning model according to Torrente quoted by is the use of games with focused goals (i.e. educational goals), becoming a tool that supports the learning process significantly. So it can be said that the Game Based Learning learning model is a learning method that involves educational technology applications designed to support students' learning process.

From the background of the problem described above, I as a researcher aim to use media that combines educational technology in the form of Interactive Visual Game Media to collaborate with the Game Based Learning learning model to optimize learning in the classroom to make it more interesting, trigger student focus, in this way can improve students' overall cognitive abilities.

From the results of previous research, it was found that the effect of using the Game Based Learning method from (Efrika Marsya Ulfa, 2022) with the title "Implementation of Game Based Learning to Improve the Cognitive Abilities of Elementary School Students" was found that this research aims to increase the cognitive abilities of students at SD Islam Nurul Muttaqin Malang city uses the implementation of Game Based Learning in the 2021/2022 academic year. Two cycle stages were carried out and two face-to-face meetings were held at the elementary school, namely Nurul Muttaqin Islamic Elementary School, Malang city. The cognitive abilities of students are still not relatively good. This can be known from the analysis that student learning will occur before entering the cycle. With the average cognitive ability of students, learning time does not meet the criteria. As many as 25% of students have completed the KKM. So it is necessary to carry out PTK activities using game-based learning methods or what can be called Game Based Learning. By implementing the Game Based Learning model, students' cognitive abilities increased in the first cycle by 15% or as many as 15 students completed. Meanwhile, in cycle II it was found that 68% or 20 students had completed. In this research, Game Based Learning was found to be able to increase students' cognitive abilities. This was stated because there was an increase in students' literacy and numeracy skills from cycles I to II. Therefore, conclusions can be drawn based on the discussion and the results of data analysis that Game Based Learning can improve the cognitive abilities of elementary school students.

In line with the research above in research conducted by (Chaterine Paulina, 2023) entitled "Effectiveness of Using Game Based Learning Models in Mathematics Learning in Elementary Schools". In this research the researcher used a qualitative approach with a literature study. It was found that overall, the results of this research provide a very positive illustration of the effectiveness of using Game-Based Learning (GBL) examples in mathematics learning in elementary schools. The main findings show that GBL has a significant impact on various aspects of learning, including understanding mathematical concepts, learning motivation, student engagement, and positive attitudes towards learning. First of all, the results of this research show that the use of GBL in mathematics learning in elementary school has a positive impact on students' understanding of mathematical concepts. The interactive approach offered by GBL allows students to learn through active interaction and more real practice. This helps them understand mathematical concepts better. GBL can be considered an effective learning model for deepening students' understanding of mathematical concepts in elementary school. Furthermore, GBL has also been proven to be effective in increasing students' learning motivation. The math games presented through GBL create a more interesting and enjoyable learning environment. This provides additional encouragement for students to be actively involved in learning. Thus, GBL has the potential to be an effective learning model in increasing students' interest in mathematics and motivating them to learn.

From the explanation of the background and previous research above, it attracted my interest as a researcher to create a quantitative article title " The Effect Of Game-Based Learning Model On Students' Cognitive Abilities On Eclipse Material In Science Learning For Elementary Schools".

2. Methodology

This research uses a quantitative experimental type method with the aim of testing how much influence the Game Based Learning learning model has on students' cognitive abilities. This research was carried out in grade 6 at Nganguk Elementary School. In this study, the sample was all 6th grade students at Nganguk Elementary School, even semester, consisting of 21 students, 11 male students and 10 female students. This research is classified as a Pre-Experimental type of research in the form of a One Group Pretest-Posttest Research Design by administering a questionnaire as a reference in assessing students' cognitive abilities which is adjusted to indicators of cognitive abilities as a reference. According to (Sianturi et al., 2024) "In this research, the Pre-Experiment One Group Prestest-Posttest Research Design research method is used, where this research only uses one group and does not require a control group, students are given a pretest which aims to measure the extent to which the abilities of each student and knowing whether there are differences between before and after the treatment is given." The flow of the stages of this research is shown in the following chart:

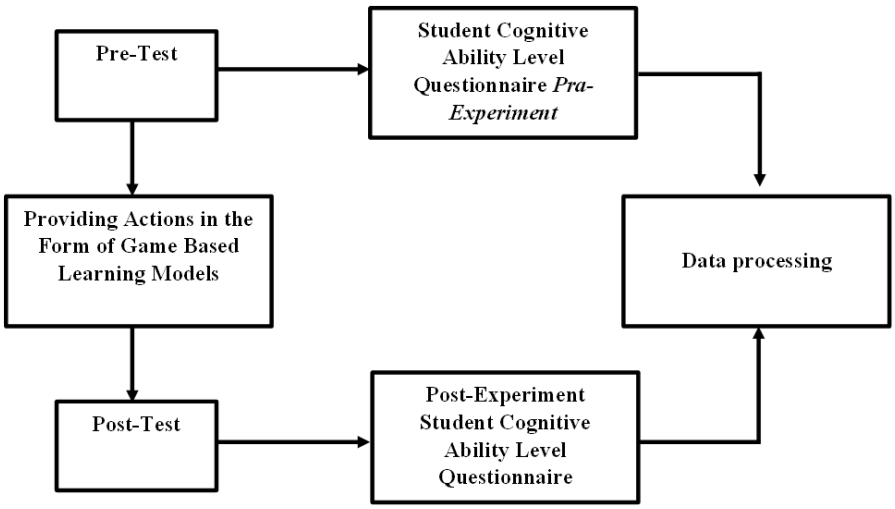

Figure 1. research flow chart

In determining the research problem, the focus was on the application of the Game Based Learning learning model to improve students' cognitive abilities at Nganguk Elementary School with stages before implementing the learning model and after implementing the learning model in the form of administering pre-test and post-test questionnaires to measure the level of students' cognitive abilities. The subjects of this research were 6th grade students at Nganguk Elementary School studying Natural Sciences (IPA). Meanwhile, at the data processing stage, it will be obtained from the pre-test and post-test results that the level of students' cognitive abilities will be compared by carrying out a t test using SPSS 20 to determine the magnitude of the influence of implementing the Game Based Learning learning model in improving students' cognitive abilities in the subject. Science in grade 6 at Nganguk Elementary School. This research hypothesis is to test how much influence the Game Based Learning learning model has on the cognitive abilities of grade 6 students. Data is said to have an influence if the significance value is <0.05 then Ha is accepted and Ho is rejected.

Research hypothesis, as follows:
Ho: There is no influence from the Game Based Learning learning model on students' cognitive abilities in the 6th grade Solar Eclipse material at Nganguk Kudus Elementary School.
Ha: There is an influence of the Game Based Learning learning model on students' cognitive abilities in the 6th grade Solar Eclipse material at Nganguk Kudus Elementary School.

3. Result

This type of research is Quantitative Experimental with Pre-Experimental type research in the form of One Group Pretest-Posttest Research Design, namely to find out the effect of the Game Based Learning learning model on students' cognitive abilities in the science subject Eclipse material by comparing the scores obtained from the questionnaire after and before received treatment (Pretest and Posttest) obtained from a sample of all 6th grade students, then using the help of the SPSS 20 application, pretest and posttest questionnaire score data from a sample of 6th grade students will be tested with a normality test and paired sample t test to find out whether the data is normally distributed and to find out the influence of the Game Based Learning learning model on students' cognitive abilities.

Table 1: Pretest and Posttest Questionnaire Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PRETEST	.199	14	.139	.912	14	.169
POSTEST	.185	14	.200*	.944	14	.465

Hypothesis Normality test

If the sign value is <0.05 then the data can be declared abnormal

If the sign value is >0.05 then the data can be declared normal

Based on the results of the Kolmogrov-Smirnova normality test table above, it is known that the pretest significance value of students' cognitive abilities is 0.139 and the posttest significance value of students' cognitive abilities is 0.200. Based on the normality test hypothesis, if the sign value is >0.05, then the data is declared normal. It can be concluded that both normality test data from the pretest and posttest are declared normal.

Table 2: Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRETEST & POSTEST	14	.858	.000

Correlation Test Hypothesis

If the sign value is >0.05 then there is no relationship.

If the sign value is <0.05 then there is a relationship.

Based on the results of the output of the correlation test or linkage test between the pretest and posttest questionnaires above, it is known that the significance value of the student's pretest and posttest is 0.000. Based on the correlation test hypothesis, if the sign value is <0.05, then the data is declared correlated or has a relationship.

Table 3: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRETEST - POSTEST	-12.00000	1.96116	.52414	-13.13234	-10.86766	-22.895	13	.000

Hypothesis Test Paired Sample t Test
If the sign value is <0.05, then there is a significant difference between the pretest and posttest value data.
If the sign value is >0.05, then there is no significant difference between the pretest and posttest value data.

Based on the output results of the paired sample t test between the pretest and posttest questionnaires above, it is known that the student pretest and posttest significance values are 0.000<0.05, so it can be concluded that there is a significant difference between the pretest and posttest questionnaire scores.

The t test is used to analyze whether or not there is an influence of the Game Based Learning learning model on students' cognitive abilities using the help of the SPSS application. From the results of the t test showing data of 0.000 < 0.05, it can be concluded that the Game Based Learning learning model has an effect on students' cognitive abilities in grade 6 science subjects at Nganguk Elementary School.

4. Discusion

The Game Based Learning learning model as (variable X) influences cognitive abilities (variable Y) in the Eclipse material. Based on the research results, it can be seen from the results of increasing students' cognitive abilities using experimental quantitative research methods with a type of pre-experimental research in the form of One Group Pretest-Posttest Research Design. By using this method, it is easier for researchers to collect data through a pretest questionnaire before being treated with the Game Based Learning learning model and a posttest questionnaire after implementing the Game Based Learning learning model. The results obtained from the pretest and posttest data obtained a significance value for the influence of the learning model on students' cognitive abilities of 0.000 <0.05, so it can be concluded that this research has succeeded in proving the effect of using the Game Based Learning learning model on the cognitive abilities of grade 6 students at Nganguk Elementary School.

In line with theory (Sianturi et al., 2024) "In this research, the Pre-Experiment One Group Prestest-Posttest Research Design research method is used, where this research only uses one group and does not require a control group, students are given a pretest which aims to measure the extent of each student's abilities and knowing whether there are differences between before and after the treatment is given." The results of this research are also strengthened by previous research by From the results of previous research it was found that the effect of using the Game Based Learning method from (Efrika Marsya Ulfa, 2022) with the title "Implementation of Game Based Learning to Improve the Cognitive Abilities of Elementary School Students" was found that this research aims to increasing cognitive abilities in students at Nurul Muttaqin Islamic Elementary School, Malang City using the implementation of Game Based Learning in the 2021/2022 academic year. Two cycle stages were carried out and two face-to-face meetings were held at the elementary school, namely Nurul Muttaqin Islamic Elementary School, Malang city. The cognitive abilities of students are still not relatively good. This can be known from the analysis that student learning will occur before entering the cycle. With the average cognitive ability of students, learning time does not meet the criteria. As many as 25% of students have completed the KKM. So it is necessary to carry out PTK activities using game-based learning methods or what can be called Game Based Learning. By implementing the Game Based Learning model, students' cognitive abilities increased in the first cycle by 15% or as many as 15 students completed. Meanwhile, in cycle II it was found that 68% or 20 students had completed. In this research, Game Based Learning was found to be able to increase students' cognitive abilities. This was stated because there was an increase in students' literacy and numeracy skills from cycles I to II. Therefore, conclusions can be drawn based on the discussion and the results of data analysis that Game Based Learning can improve the cognitive abilities of elementary school students.

From the results of the research above, based on the initial hypothesis, it can be said to be successful with the paired sample t test assisted by the SPSS 20 application, there is an influence of the use of the Game Based Learning learning model on students' cognitive abilities in the form of pretest and posttest questionnaires by applying the pre-experiment research method, one group pretest. The students' posttest on science subjects in class 6 at Nganguk Elementary School obtained a significance value of 0.000 <0.05, so there was an influence from the use of the Game Based Learning learning model on the science material.

5. Conclusion

The conclusion from the research I conducted was that the influence of using the Game Based Learning learning model was proven to have a significant effect on students' cognitive abilities. Evidence that there are changes based on the pretest in the form of a questionnaire carried out before implementing the Game Based Learning learning model, the value of students' cognitive abilities is still 65% -75%, different after implementing the Game Based Learning learning model by giving a posttest in the form of a questionnaire, the value of students' cognitive abilities changes by 75% - 90% with the t test assisted by the spss 20 application found a significance value of 0.000 < 0.05 so it can be concluded that there is a significant influence between before and after the implementation of the Game Based Learning learning model.

References

Basri, H. (2018). Kemampuan Kognitif Dalam Meningkatkan Efektivitas Pembelajaran Ilmu Sosial Bagi Siswa Sekolah Dasar. *Jurnal Penelitian Pendidikan*, 1-9.

Chaterine Paulina, S. R. (2023). Efektivitas Penggunaan Model Game Based Learningdalam Pembelajaran Matematika di SD. *Jurnal Pendidikan Tambusai*, 31348-31354.

Efrika Marsya Ulfa, L. N. (2022). Implementasi Game Based Learning untuk Meningkatkan. *Kemampuan Literasi dan Numerasi Siswa Sekolah Dasar*, 9344 - 9355.

Fitri, S. F. (2021). Problematika Kualitas Pendidikan di Indonesia. *Jurnal Pendidikan Tambusai*, 1617-1620.

Nur Fajrie, D. (2021). Analisis Keterampilan Menulis Ditinjau Dari Kemampuan Kognitif. *Jurnal Educatio*, 1394-1402.

Nur Fajrie, I. P. (2022). Analisis Pemahaman Dasar Penggunaan Smartphone di Kasus Panti Pelayanan Disabilitas Sensorik Netra. *Jurnal Pendidikan Sosial*, 285-300.

Pinton Setya Mustafa, W. D. (2020). Kurikulum Pendidikan Jasmani, Olahraga, dan Kesehatandi Indonesia Abad 21. *JurnalRiset Teknologidan InovasiPendidikan(JARTIKA)*, 422-438.

Rahmawati, N. I. (2018). Kemampuan Kognitif Siswa Sma Yang Diajar Menggunakan Model Pembelajaran Arias Pada Pokok Bahasan Kelarutan Dan Hasil Kali Kelarutan. *Chemical Studies Journal*, 33-38.

Reza Rizkiani Putri, M. K. (2021). Analisis Keterampilan Menulis Ditinjau Dari Kemampuan Kognitif. *Jurnal Educatio*, 1394-1402.

Salsabila, U. H. (2020). Peran Teknologi Pendidikan dalam Meningkatkan Kualitas Pendidikan di. *Journal on Education*, 104-112.