JPSD Vol. 9 No. 1, March 2023
ISSN 2540-9093
E-ISSN 2503-0558

THE EFFECT OF MAT JOYO APPLICATION ON STUDENTS' UNDERSTANDING OF MATHEMATICAL CONCEPTS FIFTH GRADE ELEMENTARY SCHOOL

Diana Ermawati, Nova Amalia

Primary School Teacher Education Department, Muria Kudus University

diana.ermawati@umk.ac.id

Article Info

History:
Submitted
February 3th, 2023

Revised
February 18th, 2023

Accepted
March 8th, 2023

Abstract

This research is based on the low ability of understanding mathematics in learning. Purpose of this study was to analyze differences in the ability to understand mathematical concepts before and after using the Mat Joyo application. Type of research is quantitative research with pre-experimental design research method with one group pretest-posttest design. Subjects in this study were all the fifth grade students at SD 1 Gemiring Kidul, 29 students. The data collection technique in this study was a test. The prerequisite test used the normality test with the Kolmogrov Smirnov test assisted by SPSS version 23. The hypothesis testing used the paired-samples t-test. Meanwhile, to find out the increase in students' understanding of mathematical concepts using the N-Gain test. The results showed that there were differences in the ability to understand mathematical concepts, these results were proven by results of the t-test of two dependent samples, namely sig <0.05 or 0.00 <0.05. Then there is an increase in the ability to understand mathematical concepts of 0.5922 in the medium category. It was concluded that the use of Mat Joyo application had an effect on ability to understand mathematical concepts of fifth grade students at SD 1 Gemiring Kidul.

Keywords: Mat Joyo Application, Understanding of Mathematics Concepts

A. Introduction

Education is important and inseparable from human life. Education will make human life more directed and their skills can be optimized for the future. Education itself must create an attractive learning environment and process so as to make students active to develop their potential and become a generation of qualified and competent nations in three dimensions, namely the dimensions of attitude, knowledge, and skills. (Hidayat et al., n.d.) states that the main function of education is to develop abilities and shape character, personality, and civilization with dignity in life or in other words, education functions to humanize humans so that they become human beings correctly in accordance with the norms that are used as a foundation.

Achieving these educational goals is of course closely related to the learning process in schools. Amalia et al., (2022) lessons that have an important role in school are mathematics to provide students with an understanding of mathematical concepts. (Handoko, 2017) Mathematics is the parent of science that is able to create human resources that have superior character and are ready to compete. Improving the ability to think of students who are creative, disciplined, and cooperate with each other in modern and competitive life is the main function of mathematics. The curriculum in Indonesia has specific objectives that must be achieved throught mathematics learning. The objectives to be achieved in mathematics learning are the students ability to understand problems, design methematical models, solve models and interpret the solutions obtained (Riswari & Bintoro, 2020). Whereas in mathematics learning students should be more actively involved and the teacher only becomes a guide, so that students become more active and independent (Suhaenah et al., 2021).

Wijaya (2012) full and meaningful mastery of mathematics is not only enough to know how mathematical procedures (know how) but also must understand the concepts that underlie these procedures (know why). This shows that in learning mathematics we must integrate the process of training and the process of educating. This is in line with the principle of NCTM (2000) which states the principle of mathematics learning in which students must learn mathematics through

understanding and actively build new knowledge. Learning mathematics that emphasizes conceptual understanding rather than procedural mastery will build student activity and creativity. Students will not be limited to procedures only when they are faced with a problem. Understanding the concept behind a problem is able to find varied problem solving strategies or procedures.

Students' ability to understand mathematical concepts is a basic ability to achieve higher mathematical abilities, including problem solving, reasoning, connection, communication, and mathematical representation. This is in accordance with what is explained in the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 21 of 2016 concerning the content standards of primary and secondary education which states that one of the core competencies in the field of knowledge that school students must have is the ability to understand concepts.

Concept understanding ability has a relationship with problem solving. Mathematical problem-solving ability is a very important ability in learning mathematics, because in its learning activities students learn about mathematical concepts while emphasizing the development of students ways of thinking (Ermawati & Zuliana, 2020).

(Radiusman, 2020a) Concept understanding is the ability to explain a situation in its own sentence and be able to interpret or draw conclusions. The low concept understanding ability of students can be seen that students have not been able to choose the appropriate procedure or operation in solving problems, students have not been able to apply the concepts that have been taught if given a story problem, students have difficulty solving problems whose models are different from the examples given. (Kurniati et al., 2021).

The results of pre-research conducted on Tuesday, January 31, 2023 in fifth grade of SD 1 Gemiring Kidul found that 59% of students were not complete in understanding mathematical concepts. This is evidenced by the results of the math daily test, there were 17 students who did not complete the minimum mastery criteria. These results are supported by the results of observations found that the low ability to understand mathematical concepts. The students mentioned that questions in math subjects are the most difficult types of questions to understand. The reality in the field shows that students work on problems

with practical steps and tend to only write the answers, some students still have difficulty in understanding mathematical concepts. In addition, teachers rarely use concrete learning media and other educational games.

In overcoming the problems that occur in the fifth grade mathematics learning of SD 1 Gemiring Kidul, researchers use learning media. Media can be used as an option to facilitate students' concept understanding ability, because learning media is everything both technical and physical in the learning process that can make it easier for teachers to convey learning material to students. (Tafanao, 2018). The use of media in learning is useful as a companion to overcome problems that arise in learning, one of which is educational games.

Educational games are one of the game-based learning media that are packaged to stimulate thinking including improving concentration, understanding, and solving problems. (Rahman & Tresnawati, 2016). Games as learning media can make the learning atmosphere fun and can minimize boredom with the material presented by the teacher. One of the main advantages of educational games is the visualization of real problems (Zulhelmi et al., 2022). This relates to the characteristics of fifth grade elementary school students who are at the concrete operational stage, who easily feel bored and bored when faced with an abstract learning atmosphere, so that learning is needed that can visualize learning in real terms for students. As explained by Primasari in (Kusumaningrum & Nuriadin, 2022) concrete media can help teachers when providing material because it can involve students in the process and make it easier for students to learn a form of problem solving in mathematics.

One of the educational games that can be implemented in learning to provide the ability to understand math concepts in the volume of cubes and blocks is Mat Joyo games. Games Mat Joyo is an educational game designed to provide an understanding of mathematical concepts, especially in fifth grade. In the game there is information about the volume of cubes and blocks, games (level 1, 2, 3), and evaluation. Each level in the game has 5 items of concept understanding problems that must be solved by students. The following is an overview of the Mat Joyo educational game.

Figure 1 Mat Joyo Game

Sources: (Ermawati, Riswari, & Wijayanti, 2022)

Based on this background, researchers are interested in knowing the effect of Mat Joyo application in improving students' understanding of learning concepts on the volume of cubes and beams at SD 1 Gemiring Kidul.

B. Research Methodology

This research was conducted at SD 1 Gemiring Kidul, Nalumsari District, Jepara Regency. This type of research is quantitative research with experimental methods using a one group pretest-posttest design. The subjects in this study were fifth grade students of SD 1 Gemiring Kidul totaling 29 students. The data collection technique used was a test. The test was given before and after the researcher provided treatment to measure students' achievement in the aspect of understanding mathematical concepts before and after getting treatment.

The data obtained in this study were analyzed using descriptive statistical techniques, prerequisite tests (normality test), paired samples t-test and N-Gain test.

C. Result and Discussion

The data in this study were obtained from the pretest-posttest results given before and after treatment. The data description includes the calculation of the minimum, maximum, mean, and standard deviation values. In this study, descriptive statistics of data were calculated with the help of SPSS version 23. The descriptive statistics of pretest-posttest data can be presented in the following table.

Table 1
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PreTest Eksperimen	29	30	88	63.41	16.365
PostTest Eksperimen	29	75	98	85.24	6.932
Valid N (listwise)	29				

Based on the table, it can be seen that before using the Mat Joyo application, the lowest student pretest result was 30, the highest was 88, and the average score was 63.41. Then the posttest results showed the lowest score of 75, the highest score of 98, and an average score of 85.24. This shows that there is an effect of Mat Joyo application on the understanding of mathematical concepts of fifth grade students. Jeheman et al., (2019) Stated that learning using educational games is better in improving students' concept understanding skills. Mat Joyo educational games are able to help students who have difficulty in building an understanding of the concept of the volume of cubes and beams because in addition there are questions in mat jayo games there are also questions that start from level 1-5 where the problem starts from the easiest and for level increases followed by the level of difficulty of the type of problem.

(Zulhelmi et al., 2022) suggested indicators of concept understanding as follows: 1) Clarify; 2) Interpret; 3) Exemplify; 4) Inference; 5) Compare; 6) Explain; 7) Generalizing. Concept understanding is a very important activity in learning mathematics because students can be more helpful in connecting concepts freely, quickly and accurately to solve problems. The correct understanding of concepts is taught at the lowest level of education, namely elementary school, because understanding of concepts is needed in understanding the concept of knowledge at the next level. (Radiusman, 2020b).

Prerequisite Test

Normality Test

The normality test in this study used the Komogrov Smirnov test with the help of SPSS version 23. The normality test was carried out to determine whether the data obtained from the research sample was normally distributed or otherwise. The results of the normality test calculation on the results of the pretest and posttest scores of mathematics concept understanding of fifth grade students of SD Negeri 1 Gemiring Kidul are as follows.

Table 2
Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Concept Understanding	PreTest	.140	29	.154	.954	29	.235
	PostTest	.162	29	.049	.928	29	.050

a. Lilliefors Significance Correction

Based on the data processing of the pretest and posttest results, it is known that the sig value of the pretest understanding of the concept is 0.154> 0.05 and the sig value of the posttest understanding of the concept is 0.049> 0.05. So it can be concluded that the pretest and posttest data of understanding the concept of fifth grade students of SD 1 Gemiring Kidul are normally distributed and can be used for further data analysis.

Based on the calculation of pretest and posttest data, it shows that the data has met the requirements for further analysis. Furthermore, data analysis with two dependent samples t test (paired samples t test) to determine whether there is a significant difference between the pretest and posttest results of students' concept understanding, with the following hypothesis.

H_0 : There is no difference in students' concept understanding ability before and after using the Mat Joyo application for fifth grade students of SD 1 Gemiring Kidul.

H_a : There is a difference in students' concept understanding ability before and after using the Mat Joyo application for fifth grade students of SD 1 Gemiring Kidul.

Hypothesis testing uses the provisions if sig <0.05 then H_0 rejected dan H_a accepted. The results of the two dependent samples t test (paired samples t test) can be seen in the following table.

Table 3

Paired Samples T-Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pre-Post	-21.828	11.333	2.104	-26.138	-17.517	-10.372	28	.000

Based on the table, the sig value is 0.000 because sig (0.000) <0.005 then H0 is rejected and Ha is accepted. Then it can be concluded that there are differences in students' mathematical understanding abilities before and after using the Mat Joyo application for fifth grade students of SD 1 Gemirinbg Kidul. The difference in concept understanding is because in learning the teacher uses educational games that can attract students' attention, can increase concentration, which makes students' understanding of mathematics better. This is in line with research Luthfiya (2020) with the results of using educational games is more practical to use because it can increase students' interest in learning mathematics and can facilitate students' understanding of concepts. Then Ariyanto et al., (2020) mentioned that educational games learning media are effective on the ability to understand mathematical concepts which is characterized by the achievement of completeness in concept understanding, there is a difference between students' concept understanding which has an impact on student learning outcomes.

N-Gain

The N-Gain test in this study was used to determine the magnitude of the increase in students' concept understanding ability after using the Mat Joyo application. The N-Gain test was conducted using SPSS version 23. The results of the N-Gain test can be seen in the following table.

Table 4
Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation
Ngain_Score	29	.33	.83	.5922	.11946
Ngain_Persen	29	33.33	83.33	59.2172	11.94605
Valid N (listwise)	29				

Based on the table, it shows that the N-Gain value of comprehension ability of fifth grade students of SD 1 Gemiring Kidul has increased by 0.5922. In accordance with the division of scores according to Hamzah et al., (2019) these results show an increase in understanding of mathematical concepts in moderate criteria, the use of the Mat Joyo application can help convey the content and learning objectives more quickly and easily accepted by students. This is in line with Istiqomah et al., (2022) mentioned that the use of learning media can improve students' understanding of concepts because it makes the message conveyed more interesting, this attention is important in the learning process because attention will foster stimuli that make students concentrate more.

D. Conclusion

Based on the results of data processing and analysis that the researchers have done, it shows that there is an increase in the ability to understand students' mathematical concepts before and after using the Mat Joyo application, this is shown by the results of the t test of two dependent samples (paired samples t test), namely sig 0.000 <0.005, so it is decided that Ho is rejected and Ha is accepted, thus it can be concluded that there are differences in the ability to understand concepts after using the Mat Joyo application for fifth grade students of SD 1 Gemiring Kidul. Then based on the N gain test, there was an increase in students' understanding ability of 0.5922 in the medium category.

Bibliography

Amalia, N., Ermawati, D., & Kuryanto, M. S. (2022). Pengaruh Penggunaan Metode Hypnoteaching terhadap Motivasi Belajar Matematika Siswa Sekolah Dasar. *JIIP*, *5*(7), 2614–8854.

Riswari, Lovika Ardana, & Bintoro, Henry Suryo. (2020). The Influence Of Problem-Based Learning Model In Improving Student Engagement In Mathematics. *JPSD*, *6*(2).

Ariyanto, L., Rahmawati, N. D., & Haris, A. (2020). Pengembangan Mobile Learning Game Berbasis Pendekatan Kontekstual Terhadap Pemahaman Konsep Matematis Siswa. *Jurnal Ilmiah Pendidikan Matematika*, *5*(1), 36–38.

Ermawati, D., Riswari, L. A., & Wijayanti, E.. (2022). Pendampingan Pembuatan Aplikasi MAT JOYO (Mathematics Joyful Education) bagi Guru SDN 1 Gemiring Kidul. Jurnal SOLMA, 11(3), 510-514.

Ermawati, D., & Zuliana, E. (2020). Implementation Of Open Ended Problem On Mathematical Problem Solving Skill Of Elementary School Students. *JPSD*, *6*(2).

Hamzah, Utami, L. S., & Zulkarnain. (2019). Pengembangan Media Pembelajaran Roda Putar Fisika untuk Meningkatkan Motivasi Belajar Siswa. *ORBITA: Jurnal Hasil Kajian, Inovasi, Dan Aplikasi Pendidikan FIsika*, *5*(2), 77–81.

Handoko, H. (2017). Pembentukan Keterampilan Berpikir Kreatif pada Pembelajaran Matematika Model Savi Berbasis Discovery Learning and Teaching. *Eduma*, *6*(1), 85.

Hidayat, R., Ag, S., & Pd, M. (n.d.). *Buku Ilmu Pendidikan Rahmat Hidayat & Abdillah*.

Istiqomah, P., Werdhiana, I. K., & Unggul, W. (2022). Pengaruh Penggunaan Media Video Terhadap Peningkatan Pemahaman Konsep Suhu dan Kalor Pada Siswa Kelas X Man 1 Palu. *Jurnal Pendidikan Fisika Tadulako*, *5*(3).

Jeheman, A. A., Gunur, B., & Jelatu, S. (2019). Pengaruh Pendekatan Matematika Realistik terhadap Pemahaman Konsep Matematika Siswa. *Mosharafa: Jurnal Pendidikan Matematika*, *8*(2), 191–202.

Kurniati, A., Jannah, N., & Fitraini, D. (2021). Pengaruh Penerapan Model Pembelajaran Kooperatif Tipe Teams Games Tournaments terhadap Pemahaman Konsep Matematis berdasarkan Kemandirian Belajar Siswa. *Journal for Research in Mathematics Learning) p*, *4*(1), 51–062.

Kusumaningrum, R. S., & Nuriadin, I. (2022). Pengaruh Pendekatan Matematika Realistik Berbantu Media Konkret terhadap Kemampuan Representasi Matematis Siswa. *Jurnal Basicedu*, *6*(4), 6613–6619.

Luthfiya, U. Z. (2020). Pengembangan Game Edukasi "Beruang Pintar (Belajar Bangun Ruang Pintar)" untuk Memfasilitasi Pemahaman Konse. *UNION : Jurnal Pendidikan Matematika*, *8*(2).

NCTM. (2000). *Principles and Standards for School Mathematics.* NCTM.

Radiusman. (2020a). Studi Literasi: Pemahaman Konsep Siswa Pada Pembelajaran Matematika. *Jurnal Pendidikan Matematika Dan Matematika*, *6*(1), 191–202.

Radiusman, R. (2020b). Studi Literasi: Pemahaman Konsep Anak Pada Pembelajaran Matematika. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *6*(1), 1.

Rahman, R. A., & Tresnawati, D. (2016). Pengembangan Game Edukasi Pengenalan Nama Hewan Dan Habitatnya Dalam 3 Bahasa Sebagai Media Pembelajaran Berbasis Multimedia. *Jurnal Algoritma*, *13*(1).

Suhaenah, E., Hidayat, S., & Nulhakim, L. (2021). The Application Of Stad Type Of Cooperative Learning Model To Improve The Mathematics Learning Outcomes Of Fourth-Grade Students At Sdn Rawu Serang City. *JPSD*, *7*(2), 118–129.

Tafanao, T. (2018). Peranan Media Pembelajaran Dalam Meningkatkan Minat Belajar Mahasiswa. *Jurnal Komunikasi Pendidikan*, *2*(2).

Wijaya, A. (2012). *Pendidikan Matematika Realistik Suatu Alternatif Pendekatab Pembelajaran Matematika*. Graha Ilmu.

Zulhelmi, Syaflita, D., & Amelia, N. C. (2022). Pengaruh Penerapan Model Pembelajaran Poe Berbantukan Game Edukasi Berbasis Aplikasi Educandy Untuk Meningkatkan Pemahaman Konsep Pada Materi Suhu Dan Kalor Di SMPN 25 Pekanbaru. *Jurnal Manajemen Pendidikan*, *7*(2), 86–94.

.