

Improving Mathematical Knowledge Through The Student Facilitator And Explaining Learning Model Assisted By Fraction Board Media

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ABSTRAK

Siswa kurang memahami materi matematika dikarenakan siswa menganggap matematika sangat sulit. Hal ini berdampak pada pemahaman siswa yang sangat rendah. Tujuan penelitian ini yaitu menganalisis model Pembelajaran Student facilitator and explaining Berbantuan Media Papan Pecahan Terhadap Kompetensi Pengetahuan Matematika Siswa Kelas V SD. Jenis penelitian ini yaitu kuantitatif dengan desain eksperimen semu. Populasi berjumlah 490. Metode pengumpulan data yaitu metode tes dengan menggunakan tes obyektif. Instrument pengumpulan data yaitu tes objektif dalam bentuk pilihan ganda. Teknik analisis data yaitu analisis statistik deskriptif dan inferensial. Hasil analisis data menunjukkan bahwa terdapat perbedaan yang signifikan dari kompetensi pengetahuan Matematika antara siswa yang diberi perlakuan menggunakan model pembelajaran student facilitator and explaining berbantuan media papan pecahan dengan siswa yang tidak diberikan perlakuan berupa model pembelajaran student facilitator and explaining berbantuan media papan pecahan. Disimpulkan bahwa model pembelajaran student facilitator and explaining berbantuan media papan pecahan berdampak positif dalam meningkatkan kompetensi pengetahuan Matematika. Model pembelajaran student facilitator and explaining berbantuan media papan pecahan dapat membantu siswa belajar.

ABSTRACT

Students need help understanding math material because students think mathematics is very difficult. It has an impact on student understanding which could be much higher. This research aims to analyze the Student Facilitator and explain Learning Model with the Help of Fractional Board Media on the Competence of Mathematics Knowledge of fifth-grade Elementary School Students. This type of research is quantitative with a quasi-experimental design. The population is 490. The data collection method is the test method using objective tests. The data collection instrument was an objective test in the form of multiple choice. The data analysis technique was descriptive and inferential statistical analysis. The results of the data analysis showed that there were significant differences in the competency knowledge of Mathematics between students who were treated using the student facilitator and explaining learning model assisted by fraction board media and students who were not given treatment in the form of student facilitator and explaining learning model assisted by fraction board media. It was concluded that the student facilitator and explanation learning model with the help of fraction board media positively impacted the competence of Mathematical knowledge. The student facilitator and explaining the learning model with the help of fractional board media can help students learn.

1. INTRODUCTION

Education is a process that students must pass to get maximum potential and become better people. The education that students get while at school is carried out through learning activities that can shape the knowledge, skills, and attitudes of students so that the quality of students becomes better than before (Brandmiller et al., 2020; Manullang et al., 2022; Mulyono, 2019). Learning is one of the interactions between students and teachers with media and teaching material assistance given to students

so that students' abilities increase (Yasunaga et al., 2020; Younis et al., 2021). Learning activities that are carried out well will make students gain knowledge to shape their attitudes and skills (Lee et al., 2019; Lestari et al., 2021). It causes the teacher to prepare appropriate strategies and methods for students to achieve learning objectives optimally (Hotimah, 2020; Yulia et al., 2019). In learning activities, students must actively learn to understand and master the learning material. Learning is one of the efforts made to achieve changes in human beings which involve changes in character or behavior for the better through training or experience (Brandmiller et al., 2020; Huda et al., 2019).

The Covid-19 pandemic has changed many sectors of life, especially education. The impact of Covid-19 has made students' competence (Gularso et al., 2021; Sari et al., 2021). Learning activities nationally or internationally are also experiencing a learning crisis. Previous research findings also found that many children in Indonesia still v The government must make various efforts to overcome these problems by designing a new curriculum. The new curriculum system is now called the independent curriculum. The independent curriculum is one of the prototype curricula launched by the government, which is a curriculum for various intra-curricular learning (Baharuddin, 2021; Rahmadayanti & Hartoyo, 2022). This curriculum aims to hone students' interests and talents so that students can master the material well and can develop student character well. The independent curriculum is designed to make it easier for teachers to design learning activities to achieve learning objectives (Baharuddin, 2021; Rahmadayanti & Hartoyo, 2022). This Independent Curriculum will be used as the national curriculum in 2024. It causes teachers to understand the concept of the Independent Curriculum so that they can apply it in learning activities. This independent curriculum is also not mandatory to be implemented in educational units because not all schools are ready to use this curriculum.

One of the contents that elementary school children must obtain is mathematics. Mathematics is one of the main learning materials focusing on numeracy skills to build students' cognitive abilities (Prasetya et al., 2021; Wiryanto, 2020). Students who understand learning mathematics will build their thinking skills to influence how they deal with various things (Arianti et al., 2019; Atmoko et al., 2017; Dara Asshofi & Damayani, 2019). However, only some students like mathematics. Because students consider learning mathematics to be very complicated, so students tend to be afraid when learning mathematics (Prabaningrum & Putra, 2019; Saraswati & Agustika, 2020). The fear of students in learning mathematics certainly impacts students' lack of understanding (Nurrahmi et al., 2019; Ulia & Sari, 2017). In addition, students also feel bored when participating in class learning activities. Previous research also revealed that many students still need help understanding mathematics material (Yusri, 2018). Other research findings also state that students have difficulty and are afraid when learning mathematics, which impacts students' low mathematical abilities (Anjarsari et al., 2020; Ramadayanti & Adzima, 2022).

The results of observations made at SD Gugus Ir. Soekarno South Denpasar also found obstacles in mathematics learning activities. The results of interviews with guardian teachers found that students lacked understanding of math material because students felt very afraid and thought mathematics was very difficult. In learning activities, students are also very embarrassed to ask and answer questions in front of the class. Teacher learning activities only use the lecture and question and answer method to explain a learning material. Learning activities are only centered on the teacher, so students tend to be passive when learning activities occur. It certainly impacts student learning outcomes that have yet to reach the good category. The results of the data analysis found that 29.61% of students got good categories, and 70.39% got poor results.

The solution used by the teacher in overcoming students' learning mathematics problems is by applying the right learning model for students. The learning model is an important component in supporting the success of learning (Kurnia et al., 2019; Kusuma & Hamidah, 2019). It causes the selection of appropriate learning models to impact student success in achieving learning goals (Arthaningsih & Diputra, 2018; Aziz et al., 2020). Teachers must correctly understand the use of learning models, so students more easily participate in learning activities. Using the right learning media will make learning more effective. One of the appropriate learning models for learning mathematics is the Student Facilitator and Explaining (SFAE) learning model with the aid of fraction board media. The student facilitator and explaining (SFAE) learning model is effective because students actively express ideas and opinions in learning activities (Riadi et al., 2022; Ruhulesin et al., 2019). This learning model can also train students to dare to appear in front of and speak about how to convey their ideas. It is what causes applying the SFAE model to help students learn. Media use can also make it easier for students to understand learning material (Prasetya et al., 2021; Widiarti et al., 2021). One of the media that can be used is fraction board media. This media can facilitate student learning so students will easily understand math material.

The findings of previous research also revealed that the student facilitator and explaining (SFAE) learning model would make it easier for students to learn. It impacts increasing student learning outcomes (Wardah & Arifin, 2022; Witarsa, 2017). Other research findings also state that using

appropriate learning media will make learning mathematics easier and increase student learning outcomes (Mustakim, 2020; Ridha et al., 2020). There has yet to be a study on the student facilitator and explanation learning model with the help of fractional board media on the competence of mathematics knowledge of fifth-grade elementary school students. The advantages of this research are the student facilitator and explaining (SFAE) learning model combined with fractional board media, which helps students learn mathematics. In addition, the use of media can increase student learning motivation. This research aims to analyze the student facilitator and explain the learning model with the help of fractional board media on the mathematics competence of fifth-grade elementary school students.

2. METHOD

This study will use a type of quantitative research with a quasi-experimental design. This experimental research was conducted at SD Gugus Ir. Sukarno South Denpasar. There are nine elementary schools in Cluster Ir. Soekarno South Denpasar, namely SD Negeri 2 Pedungan, SD Negeri 5 Pedungan, SD Negeri 7 Pedungan, SD Negeri 10 Pedungan, SD Al Azhar Syfa Budi, SD Tri Murti, SD Wahidiyah, SD/MI Permata Hati, MI Al Muhajirin. The population in this study was the entire fifth-grade population of SD Gugus Ir. Soekarno South Denpasar, totaling 490. The technique that will be used in determining the sample in this study is using cluster random sampling technique. The method used in collecting data is the test method using objective tests. The instrument used in collecting data is an objective test using multiple choice. The number of multiple-choice objective tests that will be given is 30 items using four answer choices which will later be selected as answers (a, b, c, and d).

When the instrument has been collected, then the instrument is tested and will get a result that will then be tested for content and item validity. Instrument content validity test using the Gregory formula. Test the validity of the test items using the Product Moment correlation formula (Agung, 2014). Test the reliability of the test device using the Kuder-Richardson formula (KR-20). The techniques used to analyze the data are descriptive statistical and inferential statistics. In this study, the purpose of the descriptive analysis was to describe data about the competence of students' mathematical knowledge taught by the student facilitator and explain the learning model to students who were not taught by the student facilitator and explaining learning model. Inferential statistical analysis is used to test success related to learning outcomes before and after being given treatment, after which conclusions are drawn. The t-test is used to test the hypothesis. Before conducting the t-test, several conditions must be met to test the hypothesis, namely the data analysis prerequisite test.

3. RESULTS AND DISCUSSION

Results

This study aims to analyze the Student Facilitator and explain Learning Model Aided by Fractional Board Media on the Mathematics Knowledge Competence of Fifth Grade Students in Elementary School. Based on the results of the analysis of quantitative descriptive data from the pretest of the experimental class, it was found that the mean calculation result of the experimental group was 15.06. The median of the experimental group was 14.816. The mode of the experimental group is 14.3. The standard deviation of the experimental group is 3.618. The variance of the experimental group is 13.089. Based on the results of the analysis of quantitative descriptive data from the posttest of the experimental class, it was found that the mean of the experimental group was 22.48. The median of the experimental group was 23.65. The mode of the experimental group is 25.15. The standard deviation of the experimental group is 4.449. The variance of the experimental group is 19.793. The results of quantitative descriptive data analysis in the experimental group are presented in Table 1.

Table 1. Description of Pretest and Posttest Data of the Experiment Group

No	Statistics	Pretest	Posttest
1	Mean	15.06	22.48
2	Median	14.82	23.65
3	Mode	14.30	25.15
4	Standard Deviation	3.62	4.45
5	Variance	13.09	19.79

Based on the polygon graph above, it can be seen that the mean is greater than the median, and the median is greater than the mode ($M > Me > Mo$), thus forming a positive squint curve. It means that most

of the scores tend to be low. Furthermore, the average pretest score of students' mathematical knowledge competence in the experimental group with $M = 15.06$ was converted into the rating scale category in the medium category. The results of data analysis stated that the mean is smaller than the median, and the median is smaller than the mode ($M < Me < Mo$), thus forming a negative squint curve. It means that most of the scores tend to be high. Furthermore, the average posttest score of students' mathematical knowledge competence in the experimental group with $M = 22.48$ was converted into the rating scale category in the high category.

Based on the results of the analysis of quantitative descriptive data from the control class pretest, it was found that the mean calculation result of the control group was 13.5. The median of the control group was 13.125. The mode of the control group is 12.642. The standard deviation of the control group is 4.152. The variance of the control group is 17.239. Based on the results of the analysis of quantitative descriptive data from the posttest control class, it was found that the mean of the control group was 18.75. The median of the control group was 18.5. The mode of the control group is 17.51. The standard deviation of the control group is 4.146. The variance of the control group is 17.189. The results of quantitative descriptive data analysis in the control group are presented in [Table 2](#).

Table 2. Description of the Control Group's Pretest and Posttest Data

No	Statistics	Pretest	Posttest
1	Mean	13.50	18.75
2	Median	13.13	18.50
3	Mode	12.64	17.51
4	Standard Deviation	4.15	4.15
5	Variance	17.24	17.19

Based on the polygon graph above, it can be seen that the mean is greater than the median, and the median is greater than the mode ($M > Me > Mo$), thus forming a positive squint curve. It means that most of the scores tend to be low. Furthermore, the average pretest score of students' mathematical knowledge competence in the experimental group with $M = 13.5$ was converted into the rating scale category in the medium category. The results of data analysis show that the mean is greater than the median, and the median is greater than the mode ($M > Me > Mo$), thus forming a positive squint curve. It means that most of the scores tend to be low. Furthermore, the average score of the pretest competence in mathematics knowledge of control group students with $M = 18.75$ was converted into the rating scale category in the medium category.

The data that has been analyzed will then be tested for normality and homogeneity. Based on the results of the analysis of normality test data in the experimental class pretest, the data is normally distributed with the results $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, while $\chi^2_{\text{count}} = 1.406$ and $\chi^2_{\text{table}} = 11.070$ at a significance level of 5%. The results of the analysis of the normality test data in the posttest of the experimental class are that the data is normally distributed with the results $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, while $\chi^2_{\text{count}} = 7.441$ and $\chi^2_{\text{table}} = 11.070$ at a significance level of 5%. Based on the results of the analysis of normality test data in the control class pretest, the data is normally distributed with the results $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, while $\chi^2_{\text{count}} = 3.784$ and $\chi^2_{\text{table}} = 11.070$ at a significance level of 5%. The results of the analysis of the normality test data in the posttest control class are that the data is normally distributed with the results $\chi^2_{\text{count}} < \chi^2_{\text{table}}$, while $\chi^2_{\text{count}} = 1.753$ and $\chi^2_{\text{table}} = 11.070$ at a significance level of 5%. The results of the analysis of the normality test for the distribution of pretest and posttest data for the experimental and control groups are presented in [Table 3](#).

Table 3. Data Distribution Normality Test

No	Mathematics			Conclusion
	Knowledge Competency Data	χ^2_{count}	χ^2_{table}	
1	Pretest Experiment	1.406	11.070	Normal
2	Pretest Control	3.784	11.070	Normal
3	Posttest Experiment	7.441	11.070	Normal
4	Posttest Control	1.753	11.070	Normal

The pretest homogeneity test data analysis results are the Fcount of 1.317. Furthermore, the value of Fcount is compared with Ftable at a significance level of 5%. With df quantifier = $k-1 = 2 - 1 = 1$, df denominator = $n-k = 55 - 2 = 53$, then Ftable at a significance level of 5% is 1.922, so it can be concluded

that the variance of the data on mathematics learning outcomes in the experimental and control groups is homogeneous. The results of the posttest homogeneity test data analysis, namely F_{count} of 1.151. Furthermore, the value of F_{count} is compared with F_{table} at a significance level of 5%. With df quantifier = $k-1 = 2 - 1 = 1$, df denominator = $n-k = 55 - 2 = 53$, then F_{table} at a significance level of 5% is 4.023, so it can be concluded that the variance of the data on mathematics learning outcomes in the experimental and control groups is homogeneous. The results of the prerequisite test, namely the normality test of data distribution and homogeneity of variance, showed that the data from the experimental and control groups were normally distributed and homogeneous. After obtaining the results of the data analysis prerequisite test, it is followed by testing the research hypothesis. Testing the hypothesis using t-test analysis with the pooled variance formula. Before conducting the t-test analysis, the score gain was analyzed from the pretest and posttest data on the competence of mathematical knowledge of the experimental and control groups.

Based on the results of data analysis, it was found that the t_{table} value with a significance level of 5% with $db = 53$ ($n_1 + n_2 - 2$) was 2.02. Because the t_{count} value is greater than the t_{table} value ($4.390 > 2.002$), H_0 is rejected, and H_1 is accepted. There was a significant difference in the competence of mathematical knowledge between groups that were taught using the student facilitator and explaining learning model assisted by fraction board media and the group that was not taught using the student facilitator and explaining learning assisted by fraction board media in fifth-grade students at SD Gugus Ir. Soekarno South Denpasar for the 2022/2023 academic year.

Discussion

The analysis of the mathematics competency data showed significant differences between students who were taught using the Student Facilitator and Explaining learning model assisted by Fractional Board media and students who were not taught using the Student Facilitator and Explaining learning model by Fractional Board Media. The student facilitator and explaining learning model have several stages. In the first stage, students are divided into several groups. At this stage, the teacher explains the material's important points. Explanation of this important point is done so students can understand the material more easily (Rou & Yunus, 2020; Saisabila, 2018; Witarsa, 2017). In the next stage, the teacher guides groups of students to make a chart of fractions. Group activities allow students to help each other study in groups and express their creativity in making an interesting chart (Prameswari & Anik Lestarinigrum, 2020; Suaeb et al., 2018; Wardani & Wiyasa, 2020). Other findings also state that group learning makes learning easier for students (Muthoharoh, 2017; Nuryanti, 2019).

In the next stage, groups of students learn to present their ideas or opinions in front of the class to other students. These activities can train students to convey ideas or opinions (Dewi et al., 2017; Putra et al., 2018). Therefore, the student facilitator and explaining learning model is a learning model that provides opportunities for students to participate in solving mathematical problems. Students are also allowed to explain material they have understood to other students. Previous findings also state that the student facilitator and explaining learning model requires students to learn to present ideas/opinions to other fellow students (Eristiani et al., 2020; Rizki et al., 2020). The student facilitator and explaining learning model gives freedom of opinion and expresses students' ideas so that students are no longer afraid to argue in mathematics learning (Avidasari, 2018; Mustika & Ain, 2020). Based on the explanation of the student facilitator and explaining learning model activities above, it shows that the student facilitator and explaining learning model can make students more active and gain experience as peer tutors for other students and train them to express their own opinions in front of the class.

In addition to applying the student facilitator and explaining the learning model, some things play an important role in this study: the application of fractional board media. Fractional board media is an alternative medium that can improve students' mathematical knowledge competence because it can instill the basic concepts of fractions to fraction arithmetic operations. Media use can support learning activities (Hutauruk & Sidabutar, 2020; S. Wulandari, 2020). Previous research findings also state that learning media helps students understand the material (Anjarsari et al., 2020; Effendi et al., 2021; Nurmitasari et al., 2020). The use of fractional board media will be easier to understand because this fractional board media includes concrete objects. Concrete media can stimulate students' thoughts and interests to increase learning enthusiasm (Bahtiar, 2019; Handayani & Rochmahwati, 2020; Hastuti et al., 2019). This is in line with research which states that using fractional board media can help understand the material (Ismawanti et al., 2022; Nikmatillah, 2018).

This study's results are similar to the findings of several previous studies, which state that applying the student facilitator and explaining the learning model can improve students' mathematics learning outcomes (Yuwandari1 & Hariyani, 2019). Using the SFAE learning model has seen students actively participate and improve learning outcomes (Avidasari, 2018; Widiasih, 2019). It is evidenced by

using the SFAE learning model, which has actively involved students and improved mathematics learning outcomes. Based on this explanation, this research implies that using a student facilitator and explaining the learning model assisted by fractional board media can help students learn so that it impacts the competence of mathematics knowledge of fifth-grade elementary school students.

4. CONCLUSION

Based on the results of the analysis, there is a significant difference in the competence of mathematical knowledge between students who are taught using the Student Facilitator and Explaining the learning model with the help of Fractional Board media and students who are not taught with the Student Facilitator and Explaining learning model with the help of Fractional Board media. It was concluded that the student facilitator and explanation learning model, with the help of fractional board media, could improve the competence of mathematics knowledge of fifth-grade elementary school students.

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