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Improvement of Direct Learning Model Using Calculator on Mathematics Learning Achievement of Roving Material and Flat Area in Grade IV Elementary School

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ABSTRACT

This study aims to determine whether the results of learning achievement of students who apply to learning using a direct learning model using a calculator obtain better results than classes that apply to learning using conventional models. This research is quasi-experimental research using a pretest-posttest control group design. The population in this study was the fourth grade of SD UMP, Kembar sub-district, Banyumas Regency, in 2020, which amounted to 59 students. The sample in this study is class IV A, totalling 29 students, and class IV B, totalling 30 students. Class IV A is an experimental class using the application of learning with direct learning models. Class IV B is a control class using the application of direct learning models without a calculator. The sampling technique used is cluster random sampling. The data collection technique in this study was a test in the form of a description, namely pretest and posttest. The results of nonparametric test calculations in u-test Ho are rejected, and Ha is accepted. The results of calculations using SPSS obtained sig < 0.05 or sig 0.001 < 0.05, so there was a significant difference between the experimental class and the control class. Based on the results obtained from the data, it can be concluded that the direct learning model uses a calculator to measure mathematics learning achievement in the material of circumference and area of flat shapes in grade IV elementary school.

Keywords: Learning Achievement, Calculator, Direct Learning Model.

INTRODUCTION

Mathematics is a subject taught from elementary school to high school equivalent and even college (Nurhaswinda, 2019). Early knowledge of mathematics is very important, especially for primary school students. Such initial knowledge includes numeration, division, addition and subtraction. This initial knowledge is fundamental to many school learning and teaching processes (Iqbal et al., 2021; Seven, 2020). Mathematics is also a major "vehicle" for developing children's logical thinking skills and higher cognitive skills. Mathematics plays an important role in a number of other scientific fields such as physics, engineering, and statistics (Kandemir & Demirbag-Keskin, 2019; Kyriacou & Khozim, 2021).

The ability of mathematical calculations in everyday life will always be used. Students in Indonesia have low mathematical skills based on the results of the Programme for International Student Assessment (PISA) test conducted in 2015. Coughlan, S (Fernandez & Joseph, 2020)

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stated that Indonesia ranked 69 out of 76 participating countries. This ranking can be used as a prediction of a country's long-term economy. (Süren & Kandemir, 2020) stated that students in other countries learn mathematical skills by considering the availability of technology in life, while education in Indonesia still imagines life before there were calculators and computers. Students in Indonesia still emphasize routine low-level thinking skills such as memorizing formulas and adhering to complex counting procedures (Sholihah et al., 2022).

The use of this calculator can provide benefits for its users. The use of calculators in learning mathematics turns out to bring up a lot of responses from everyone. Based on interviews with teachers and parents (Kandemir & Demirbag-Keskin, 2019), it is stated that the use of calculators is prohibited in elementary schools because it can cause fooling students. This makes most schools do not use calculators as a calculation tool in learning and teaching. Students so far only learn mathematics manually.

Recent research says the existing evidence does not show that the use of calculators as a mathematics learning aid in elementary schools will not make children stupid or too lazy to count; on the contrary, it can make children creative, have broader knowledge and exploratory spirit (Nurharyanto, 2023). The use of calculators can make mathematics fun for students, with students liking mathematics then students will love mathematics. So the use of calculators is in accordance with the orientation of mathematics learning (Nurharyanto, 2023). The conclusion is that the use of calculators does not make students stupid but makes students become creative in enriching knowledge. Make maths fun for students and maths a delight for students. Fun in the sense that mathematics is a subject that students are not afraid of, feared because of problems that are considered difficult by students so that it will make students bored (Guo et al., 2024; Ramani & Scalise, 2020). Mathematics is interesting because it has many symbols that students know and understand, not only memorising but also developing skills in using calculators (Rahayu et al., 2023).

Mathematics skills development is the third stage of four stages of mathematics learning according to (Cragg & Gilmore, 2014; Sun et al., 2021). Skill coaching needs to be taught using various tools and media such as calculators. The teacher mentioned that not many teachers or students are able to use calculators to solve various mathematical calculations (Ivanovski et al., 2021; Rohaeni, 2020). Based on this, fostering student skills in learning mathematics requires appropriate guidelines that are interesting to students and more contextual with school situations and conditions or students' socio-cultural environments.

Research that will be examined about the direct learning model that determines the level of absorption and understanding of students towards the material or concepts delivered by the teacher. The right and interesting learning model will make the teaching and learning atmosphere comfortable so that it allows each student to get an atmosphere that allows them to receive the concepts and material presented. The direct learning model is one of the teaching approaches specifically designed to support the student learning process related to declarative knowledge and well-structured procedural knowledge that can be taught with a gradual, step-by-step teacher-centered activity pattern (Ilyas et al., 2020; Toh & Kirschner, 2020) Learning

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and teaching are concepts that cannot be separated from the learning process. Learning refers to what a person should do as a subject in learning, while teaching refers to what a teacher should do as a teacher.

This research takes grade IV, this is because in class IV is a transition class where from low grade to high class which is expected in class IV, student conditions are very good for instilling concepts in mathematics. According to Das (2020), one of the developmental tasks of elementary school-age children is to acquire a number of concepts needed to think effectively and learn to count.

Researchers took research subjects at SD UMP because according to data for the 2018/2019 academic year, SD UMP ranked first at the Twin District level with an average score of 280.8 out of 37 public and private schools (Gunanto, 2016). Especially in mathematics subjects get a score of 100.0. With this value of 100.0, researchers want to explore mathematics learning at SD UMP further. The teacher's way to deliver the material so that students can achieve a grade of 100.0. In addition, researchers chose SD UMP strengthened because this study was an umbrella study. UMP Elementary School is a campus labschool of the University of Muhammadiyah Purwokerto.

Researchers are interested in this research because in a simple direct learning model the teacher as the center, is expected to be able to answer myths in the use of calculators that many people make fools. A calculator that is oriented to the results but can introduce and explain the proper use of symbols in mathematical applications. Relation to the circumference and area of flat building which uses many formulas in understanding and mathematical skills. The formulas are not only memorized but can be understood by skill using a calculator. Calculators are able to hone students' skills in learning. The use of calculators in perimeter and flat area material is expected later after students understand and are able to operate the calculator correctly, it can increase student learning achievement.

Research conducted by Nurhaswinda (2019) in the Basicedu National Journal with the title "Increasing Understanding of the Concept of Multiplication Assisted by a Calculator in Mathematics Learning Subjects in Grade IV of State Elementary School 2 West Palimanan, Cirebon". Based on the results of his research concluded that calculators can be used in mathematics learning with the intention of enriching the teaching and learning process. Calculators are used as a tool to develop counting skills.

Research conducted by Kissane (2017) in the Proceedings of the Biennial Conference of the Australian Association of Mathematics Teachers entitled "Learning with calculators: Doing more with less" states that calculators continue to be misinterpreted as devices solely for calculations, although the possible contribution to learning mathematics with modern calculators arises from other characteristics. A four-part model for understanding the educational importance of calculators showing each of the four compositions (representation, calculation, exploration, and illustration) is highlighted and illustrated, mostly with relatively sophisticated modern calculators such as those widely accessed by students in years 6-10, but also recognising some of the calculator features available to young Australian students. . This

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intelligent use of calculators at the school level offers many opportunities for students to develop a solid understanding of key aspects of maths through their own actions, provided that the calculator that is clearly visible within our calculator is only an addressable 'answering tool'. The similarity of Kissane's research with the research carried out is that both examine the use of calculators in the classroom. The difference is that researchers are the importance of using calculators on mathematics learning achievement in grade IV elementary schools.

This study aims to examine the impact of direct learning models using calculators on the mathematics learning achievement of fourth-grade students, specifically focusing on the concepts of perimeter and area of flat shapes. Conducted at SD UMP, a school renowned for its exceptional academic performance, particularly achieving a perfect score of 100.0 in mathematics during the 2018/2019 academic year, this research seeks to explore the effective teaching strategies contributing to such high achievement. The use of calculators is expected to enhance students' conceptual understanding and operational skills in mathematics, addressing the myth that calculators are merely for simple calculations. The study also aims to provide insights into teaching methodologies at SD UMP that can be adopted by other schools to improve mathematics instruction. Thus, this research supports the use of calculators as educational tools that enhance representation, calculation, exploration, and illustration in mathematics learning, as highlighted by Kissane (2017), and contributes to evidence-based educational practices to improve student learning outcomes.

RESEARCH METHOD

The subjects in the study were grade IV students of SD UMP Kembar sub-district, totaling 59 students, consisting of 30 control students and 29 experimental students. The research was carried out in stages during the first semester of the 2019/2020 academic year. The type of research conducted used Quasi-Experimental research methods.

The Quasi-Experimental method is used to examine the effect of an intervention or treatment when the random assignment of subjects to control and experimental groups is not feasible. In this study, the researchers compared the outcomes of two groups: one that received the intervention (experimental group) and one that did not (control group). By analyzing the differences between these groups, the researchers aimed to infer the impact of the intervention. This method is particularly useful in educational settings where random assignment is challenging due to practical or ethical constraints.

RESULTS AND DISCUSSION

The data on the results of the pretests and postes of the experimental class and control class are described in Table 1 below:

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PretesEks	29	16	76	42.62	16.433
PretesControl	30	12	76	34.40	16.124
PostesEks	29	44	100	84.97	11.497
PostesControl	30	32	92	73.93	13.960
Valid N (listwise)	29				

Figure 1. Results of pretests and postes of the first stage

Table of pretest and posttest results of experimental class and control class using SPSS, namely with sample 29 in the experimental class and sample 30 in the control class. Pretest results were obtained in the experimental class with the lowest score of 16 and the highest score of 76 while in the control class with the lowest score of 12 and the highest score of 76. In the posttest results in the experimental class, the lowest score was 44, and the highest score was 100, while the control class had the lowest score of 32 and the highest score was 92. The average on the pretest in the experimental class was 42.6, and in the control class, which was 32.4, it can be concluded that both classes obtained equally low scores.

In the average posttest score in the experimental class, 84.9, and in the control class, 73.9, the value can be the difference in posttest results in the experimental class with the direct learning model using a calculator and the control class of conventional learning models. In the standard deviation in the experimental class, it gained 11.4, and in the control class, it gained 13.9.

Table 1. There are Differences in Achievement Results

	Rata-rata Kelas Eksperimen	Rata – rata Kelas Kontrol	Keterangan
Pretest	42,6	34,4	Sama-sama masih rendah
Post test	84,9	73,9	Terdapat perbedaan hasil prestasi

The pretest results of the two classes are still in the same state, that is, they are both still low. The experimental class obtained an average of 42.6 and the control class obtained an average of 34.4. Pretest questions are provided before learning activities to determine the initial abilities of students. After giving pretests in the experimental class and control class, then learning process activities were carried out in the control class by applying conventional learning and in experimental classes by applying learning using direct learning models and calculators.

Based on the results of student achievement, it can be seen in Tables 1 and 2 that there are differences in post-test results between the experimental class and the control class. Posttest results showed that the experimental class obtained an average of 84.9 higher than the control

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class which obtained an average of 73.9. This shows that classes that apply the direct learning model using calculators are much better than classes that use direct learning models. Not using calculators has an influence of 60% on student learning achievement. The difference in achievement results is due to differences in the provision of treatment in classroom learning activities. The stage of learning activities with a direct learning model using a calculator is at the stage of achieving clarity, conducting demonstrations using calculators, assignments carried out by students with practice doing calculator problems and practising the use of symbols in mathematics. In the core activity, students are given a problem, and then through group discussion activities, students solve problems. During the direct discussion activity, students are given the freedom to find each other how to find answers to problems given from the results of students' own ideas and students' skills using calculators. By giving freedom to students to choose for themselves how to solve the given problems to get answers, students become active in thinking, actively carrying out various activities, discussing with each other, and expressing their opinions in formulating problems to making a decision. The next activity is the results of group discussion activities presented in front of the class. Each group presented the results of the answer and explained how to get the answer variously using a calculator. The other group analyzed each other and responded to the answers of each group that were presented in front of the class. In the closing activity, teachers and students evaluate and make a conclusion to the activities that have been carried out and end with greetings.

Based on the results of hypothesis test calculations carried out in the experimental class and the SPSS sig control class. 0.05, that is, if you < U table, then Ho is rejected (H1 is accepted), SPSS data U calculate 0.001 < 0.05, so the conclusion is that there is an influence of the direct learning model using a calculator on mathematics learning achievement of roving material and flat area in grade IV Flat School. The results of this study have proven that the direct learning model using calculators used in teaching and learning activities has a very important role and affects the learning achievement of students on the perimeter and flat area material.

CONCLUSION

Based on the results of Mathematics learning achievement, experimental class students who used the direct learning method using a calculator had the most superior results compared to the direct learning method not using a calculator, with an experimental class average of 84.9 and a control class average of 73.9. There are differences in mathematics achievement scores between students who learn with a direct learning model using a calculator and students who learn using a direct learning model without a calculator. The existence of significant differences shows that calculators have a positive influence on the direct learning model. The results of the u-t man Whitney test analysis were obtained to calculate 0.001 < 0.05 so that there was a significant difference between the experimental class and the dick class so that it could be concluded that the application of the direct learning model using a calculator affected the

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achievement of mathematics learning roving material and flat area in grade IV elementary school.

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