



Improving Mathematics Learning Outcomes of Elementary School Students with the Direct Learning Method (An Experimental Study in South Papua)

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Abstract

The difficulty of learning mathematics is an obstacle problem in everyday life so it needs to be mastered properly, but most students consider mathematics to be a difficult subject, especially grade II students of SD Negeri 2 Merauke, the perception that mathematics is a difficult subject is reinforced by low mathematics learning results. Therefore, the purpose of this study is to improve students' mathematics learning outcomes using direct learning methods. The method used in this study is the quantitative method with analysis using the mean score. The population in this study was SD Negeri 2 Merauke, with a total sample of 23 students in grade II. The data in this study were obtained from observations and tests. The results showed that, the students' pre-test results were 59.13% while the results of the post-test were 82.08%. Because of this, it can be claimed that the direct learning method can improve the mathematics learning outcomes of grade II students of SD Negeri 2 Merauke, South Papua. Given the importance of mastering mathematics well, teachers should teach mathematics in a variety that is in accordance with the theory of learning mathematics accompanied by the use of teaching aids / media that can increase student learning motivation.

Keywords: Mathematics, Direct Learning Methods, Basic Mathematics

Introduction

Education plays a very important role in preparing quality human resources to ensure the sustainability of the development of a nation. Improving the quality of education in Indonesia is marked by improvements implemented by the government in every aspect of education (Liando et al., 2023); (Liando et al., 2022); (Maru et al., 2020). Starting from funding, developing learning models, improving educational facilities and infrastructure to curriculum renewal. The curriculum has indeed changed several times

before the development of the 2013 curriculum. The application of the 2013 Curriculum in the learning process uses a scientific approach or a scientific approach (Pelenkahu et al., 2023). Learning with a scientific approach is a learning process that is designed in such a way that students actively construct concepts, laws or principles. In the learning process, teachers have a very important task, namely determining, designing, and implementing the learning model to be used (Rumahlewang et al., 2023). So, teachers must be professional and competent in designing and carrying out their duties to teach

students in class, and improve the competence of mathematical knowledge in elementary schools.

The mathematics curriculum we use today is dense with material. Teachers always feel burdened with the target to complete a huge material load. If there are two teachers meeting, what will be the subject of discussion is to where the material discussion in class is. Not discussing how to deliver a material interestingly. In mathematics learning, which we should learn to reason, has been transformed into memorization lessons. It is very strange if a math lesson is given with the teacher lecturing in front of the class or "talking" with his blackboard, while the student only takes notes and then memorizes it.

Competence is a complex that contains many aspects. In the 2013 curriculum, these aspects are stated in the formulation of competencies, including core competence 1, namely spiritual, core competence 2 namely attitude (affective), core competence 3 namely knowledge (cognitive), and core competence 4 namely skills (psychomotor). Learning objectives describe the learning process and outcomes expected to be achieved by learners in accordance with basic competencies (Pelenkahu et al., 2023). Thus, competence is related to learning outcomes. Fauzi et al., (2020) stated that learning outcomes are expressed as changes that occur in students, both concerning cognitive, affective, and psychomotor aspects as a result of learning activities. In simple terms, what is meant by student learning outcomes is the ability obtained by children after going through learning activities. Knowledge competence can clearly measure students' ability to understand and master the content of a material or subject matter. Knowledge competence can also be expressed as cognitive domain competence that is able

to measure the level of student achievement in aspects of knowledge. In Permendikbud Number 104 of 2014, knowledge competence is stated with a certain score for thinking ability and dimensions of knowledge (Bariyah et al., 2023); (Desvitha & Rakhmawati, 2023); (Faridah, 2023). One of the students' knowledge competencies that also needs to be measured using grades is mathematical knowledge competence.

Mathematics is a science that underlies the development of modern technology, has an important role in various disciplines and advances human thinking (Rusli, 2018). Therefore, mathematics subjects are taught at every level of education so that students can be trained to be disciplined, thorough, resilient, able to think critically and creatively. Mathematics subjects are studied at all levels of education from elementary to tertiary education and have more class time than other subjects. Mathematics is usually considered the most difficult subject by students as well as adults (Gultom et al., 2022); (Rainis, 2019). Another fact about maths is that many students seem to become disinterested in maths, and often question the relevance of so much time spent studying the subject. However, research has proven the importance of mathematics in everyday life. Mathematics is also the main "vehicle" for developing logical thinking skills and higher cognitive skills in students. Mathematics also plays an important role in a number of other scientific fields, such as physics, engineering, and statistics (Warniti, 2020); (Dhiqfaini Sultan & Bancong, 2017); (Muslina, 2017).

In addition, Mathematics is one of the basic sciences that has an important role in education because Mathematics lessons are a means that can be used to shape students to think scientifically. The field of Mathematics taught in elementary

school includes three branches, namely arithmetic, algebra, and geometry. According to Muslina, (2017) and Tompunu, (2021) Mathematics aims to enable students to have the following abilities: 1) understand Mathematics concepts, explain the relationship between concepts or algorithms flexibly, accurately, efficiently, and precisely in problem solving; 2) solving problems which include the ability to understand problems, design mathematical models, solve models and interpret the solutions obtained; 3) have an attitude of appreciating the usefulness of Mathematics in life, namely having curiosity, attention, and interest in learning Mathematics, as well as a tenacious and confident attitude in problem solving. Therefore, the results of learning Mathematics that are expected by every school are the results of learning Mathematics that achieve completeness. Students are said to have completed learning Mathematics if the student's Mathematics learning outcomes have reached the Minimum Completeness Criteria (KKM) set by the school.

In fact, Asniah, (2020); Tompunu, (2021); Finding that there are still many students who have not met the Minimum Completeness Criteria (KKM) in each class where these students get scores below 65 in mathematics subjects. In the learning process in the cluster, the 2013 Curriculum has been implemented with a Scientific Approach but the learning model used by teachers in the learning process has not been maximized (Asniah, 2020). So that students are less enthusiastic and less active in following lessons in mathematics subjects, some students seem unfocused and less enthusiastic in following learning, students' understanding of mathematics material is still lacking. This must be immediately found a solution so that mathematics learning can meet the needs of students so that it will support students

in improving learning outcomes. The solution put forward is the application of innovative learning models in teaching and learning activities, especially in improving the competence of mathematical knowledge.

To achieve good learning outcomes is certainly not easy, teachers as educators play a big role in the learning process. Teachers must design appropriate learning methods with subject matter sourced from the curriculum. One of the right models used by teachers in learning is the direct learning model. 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 activity pattern, step by step (Putri & Panggabean, 2020). The direct learning model is also shown to help students learn basic skills and obtain information that can be taught step by step (Immanuel, 2017); (Winanto et al., 2015).

According to Nudin et al., (2021) direct learning is a learning model from a Teacher Center approach. In applying the direct learning model, teachers must demonstrate the knowledge and skills to be trained to students gradually (step by step). Direct learning is not the same as the lecture method, but lectures and retitations (checking understanding with questions and answers) are closely related to the direct learning model. Direct learning requires fairly detailed planning and execution, especially on task analysis. Direct learning is teacher-centered, but must still ensure student involvement. So the environment should be created that is oriented towards the tasks assigned to the student.

The direct teaching model is one of the teaching approaches specifically designed to support student learning

processes related to declarative knowledge and well-structured procedural knowledge that can be taught with a gradual pattern of activities, step by step (Santika et al., 2020). The syntax of the hands-on teaching model is presented in 5 phases, as follows: phase 1 conveys objectives and prepares students, phase 2 demonstrates knowledge and skills, phase 3 guides training, phase 4 checks understanding and provides feedback, phase 5 provides opportunities for training. In the learning process, a suitable method is needed, with a suitable method these difficulties will be avoided and the teaching and learning process can take place optimally. The direct learning method is very useful in the mathematics learning process and can be used as a creative alternative to correct the lack of clarity of the material. Based on these descriptions, the purpose of this study is to find out whether direct learning methods can improve students' mathematics learning outcomes in grade II SD Negeri 2 Merauke, South Papua or not.

Method

This study used Pre-Experimental Designs with One Group Pretest-postest design. According to (Sugiyono, 2016) Pre-Experimental Designs experimental results are dependent variables that are not solely influenced by independent variables. Hi this can happen due to the absence of a control variable, and the sample is not randomly selected. In this One-Group Pretest-postest design, there is a pretest before treatment. Thus, the results of treatment can be known more accurately, because it can compare with the situation before treatment and after treatment.

This study was conducted to describe the effectiveness of a treatment (direct method) given to the mathematics learning outcomes of grade II students of SD Negeri 2 Merauke. The total number of students in this study was 23 students. This

pre-experimental research is intended to test a hypothesis, whether the direct learning model is effective on the mathematics learning outcomes of students in grade II SDN 2 Merauke. In addition, data collection techniques in this study are observation and tests, test giving techniques in this study using pretest before being given treatment then given posttest after being given treatment which is used to obtain data on students' mathematics learning outcomes before being given treatment and after being given treatment using direct learning methods. The approach taken by this study uses a quantitative approach. The reason for using this approach is the data obtained from the research in the form of numbers that will be presented according to the results of observations during the study.

Findings and Discussion

In this section, a presentation will be given about the results of research and discussions that have been carried out by researchers when conducting research in grade II SD Negeri 2 Merauke, South Papua. The explanation given is a description of the existing problem formulation. This research was a research focused on mathematics learning activities using direct methods. As material for data study, researchers conduct data search activities through observation and tests to students. Tests that have been carried out during the study and produce some data that can be used as data processing. Data was obtained using statistical analysis by comparing the mean scores of the pre-test and post-test. This mean comparison will be a benchmark for the success of applying direct learning methods as an effort to improve mathematics learning outcomes of grade II students of SD Negeri 2 Merauke, Papua Selatan. The category of student success is the achievement of scores according to the completeness of

mathematics subjects at SD Negeri 2 Merauke, South Papua. In addition, the next category of success is the achievement of the mean / total average overall score of students at 75%. Based on student test results, student pre-test results are presented in table 1 below:

Table 1. Pre-test Results

No	Students	Pre-test Score
1	Student 1	60
2	Student 2	60
3	Student 3	65
4	Student 4	65
5	Student 5	60
6	Student 6	65
7	Student 7	65
8	Student 8	50
9	Student 9	50
10	Student 10	60
11	Student 11	60
12	Student 12	60
13	Student 13	60
14	Student 14	55
15	Student 15	50
16	Student 16	65
17	Student 17	60
18	Student 18	65
19	Student 19	60
20	Student 20	60
21	Student 21	60
22	Student 22	50
23	Student 23	55
Total/Mean		1.360/59.13%

Based on the results of student tests on the pre-test, it can be understood that student learning outcomes are still far from the desired average / completeness score. This is evidenced by the total number of student scores in the range of 50-65, while for the completeness of mathematics subjects must be in the 70 grade. In addition, the total mean of the

student pre-test is still very low at 59.13%. This indicates that students' knowledge in mathematics subjects based on pre-test results is still very low. Therefore, after the pre-test is analyzed, the treatment in this case applies direct learning methods as an alternative in improving students' mathematics learning outcomes at subsequent meetings. To see the results of whether this direct learning method can improve student learning outcomes, a post-test is given. Post tests are given to students at the last meeting. The results of this post-test can be seen in table 2 below:

Table 2. Post-test Results

No	Students	Post-test Score
1	Student 1	75
2	Student 2	75
3	Student 3	75
4	Student 4	75
5	Student 5	78
6	Student 6	80
7	Student 7	80
8	Student 8	85
9	Student 9	85
10	Student 10	90
11	Student 11	85
12	Student 12	87
13	Student 13	95
14	Student 14	90
15	Student 15	90
16	Student 16	75
17	Student 17	78
18	Student 18	75
19	Student 19	80
20	Student 20	90
21	Student 21	90
22	Student 22	75
23	Student 23	80
Total		1.888/82.08%

Student post-test results as described in table 2 show a very significant improvement in student learning outcomes. This result can be clearly seen, where all students achieve a maximum completeness score of 75-90. With a total mean that is much different from the pre-test which is 82.08. Thus, it can be concluded that the application of direct learning methods can improve student learning outcomes in mathematics subjects.

In addition, referring to the learning process, this direct learning model is a learning model where students gain a lot of knowledge from observing and imitating the behavior of others. This learning model helps students acquire procedural and declarative knowledge and is taught step by step. Direct instruction uses a combination of demonstrations and explanations from teachers with practice and feedback from students to gain further knowledge and skills.

Handayani & Gede, (2020) said that mathematics learning for grade II must be able to create a pleasant atmosphere so that students can absorb or understand the learning concepts learned. By paying attention to this, the learning model that can be applied is the direct learning model or *Direct Instruction*. According to Prasela et al., (2020) the direct learning model is the most effective program to measure the achievement of basic skills, expertise in understanding a material or self-concept. This learning model is teacher center or teacher plays an important and dominant role in the learning process, so it is necessary for teachers to master the material to be delivered.

According to (Nudin et al., 2021) in order for the learning model to take place as expected, the steps that need to be considered are as follows: 1) Delivering focus and learning objectives to students.

The teacher conveys what material must be learned and what students must do and master; 2) Review students' understanding of material that has been mastered before. In this step, the teacher gives questions so that they can find out the skills and knowledge of students who have been mastered; 3) Provide teaching materials. In this session the teacher provides material and presents learning material along with examples and concepts of the demonstration; 4) Conduct guidance. This guidance is carried out by providing questions to test students in the use of a scientific concept; 5) Learners are given free time to understand the material/knowledge. Understanding the material can be done individually or in groups; 6) Evaluate the ability of students and teachers to give *feedback*. Feedback refers to a review of what has been learned; 7) Create individual exercises for Learners. This session the teacher gives or makes individual task exercises that are useful for developing students' understanding of the material that has been learned.

Asniah, (2020) suggested that in the application of the direct learning model teachers must be able to convey information using diverse media that can be interesting to low-grade students such as playing music, films, teaching aids that are easy to use by students. One thing that needs to be considered is the teacher's caution in conveying concepts to students because if the correct concepts are embedded in students, they will be provisions in learning mathematics at the next stage or level.

Correspondingly, added that the hands-on learning model is the most effective program for measuring the achievement of basic skills, expertise in understanding a material and self-concept. This direct learning model is highly

determined by educators, meaning that educators play an important and dominant role in the learning process. This mention refers to a teaching style in which educators are actively involved in bringing the content of lessons to students and teaching them to all students in the class. Meanwhile, according to Surur & Tri Oktavia, (2019); (Rosmi, 2017); (Sugesti et al., 2018) the direct learning model is a teacher-centered model. The role of the teacher is as a presenter of material (teacher). Information is conveyed or transferred by the teacher to the students, then the teacher guides the students in the Exercise.

Another problem that needs to be touched upon here is the perception that develops in students that mathematics is a science that has no benefit. This is certainly very sad. Mathematics is indeed an abstract science. It may also be difficult to digest. This is natural. But as a teacher must always try to show the relevance of mathematics in real life. With the blossoming of perceptions about the irrelevance or uselessness of mathematics, students' motivation to learn mathematics decreases, or even disappears. As a result, many of our children memorize math.

In addition, the direct teaching model prioritizes a declarative approach with an emphasis on the learning process of concepts and motor skills, thus creating a more structured learning atmosphere. Teachers who use the direct teaching model are responsible for identifying learning objectives, material structure, and basic skills to be taught. Knowledge conveys knowledge to students, provides modeling/demonstration, provides opportunities for students to practice applying concepts/skills that have been learned and provides feedback.

The final results of the analysis of each student test provide a very clear picture that,

direct learning methods are indeed very effective in improving student learning outcomes in mathematics subjects. This final result is a comparison of each student's test results from pre-test to post-test. This comparison can be seen in figure 1 below:

Figure 1. Mean Score of Each Tests

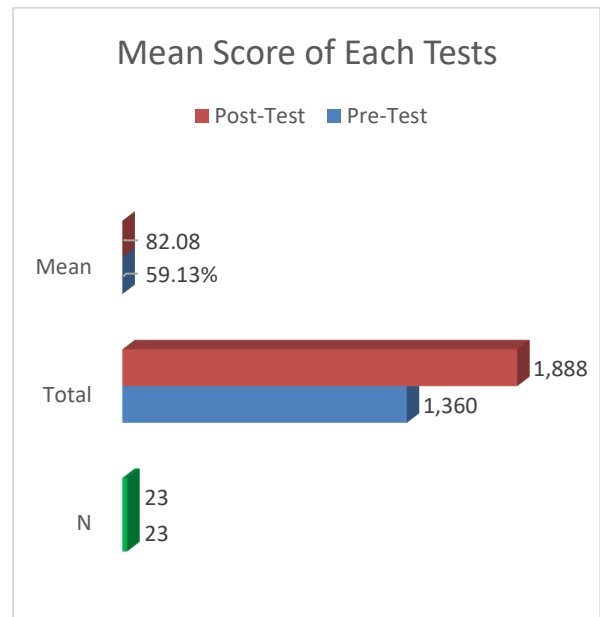


Figure 1 above clearly shows that a very significant improvement in student learning outcomes occurs after the application of direct learning methods. Where the total mean starting from the pre-test was 59.13%, increasing in the post-test to 82.08%. In line with the findings of Asniah, (2020); Rusli, (2018); Rainis, 92019) who concluded that the implementation of learning carried out through the application of explicit instruction learning affects the science learning outcomes of grade V students because the direct instruction model can help students in obtaining procedural and declarative knowledge (factual) and taught step by step. In addition, it is supported by Warniti, (2020); Dhiqfaini Sultan & Bancong, (2017); (Sukri et al., 2017) who concluded that the application of the Explicit Instruction learning model assisted by the surrounding natural environment has a positive effect on the mathematics

learning outcomes of grade IV students. In addition, by using the help of image media in the learning process students understand learning faster and do not get bored in the learning process. Where image media is easily understood by students. Based on this presentation, it can be concluded that the direct learning model (direct instruction) assisted by image media affects the competence of mathematics knowledge of grade IV students. Thus, it can be concluded that the application of the direct teaching model is able to improve students' mathematics learning outcomes in grade II SD Negeri 2 Merauke, South Papua.

Conclusion

The application of direct learning methods can improve student learning outcomes in mathematics subjects. Learning activities carried out by teachers and students take place well with the application of direct learning methods in learning. This can be seen from the test results given to students. The students' pre-test results were 59.13% while the results of the post-test were 82.08%. Because of this, it can be claimed that the direct learning method can improve the mathematics learning outcomes of grade II students of SD Negeri 2 Merauke, South Papua.

With regard to the results of the research obtained, several suggestions can be proposed as follows. Suggestions that can be conveyed based on research that has been done are as follows: 1) Students are expected to be more active, creative, can always increase curiosity through asking if there is something that is not understood, so that the development of student mindsets can be broader, critical and innovative. 2) To teachers, it is recommended to be more creative in providing supporting facilities in the form of learning implementation innovations by

applying direct learning models (direct instruction) assisted by image media so as to create meaningful learning and increase student enthusiasm for learning. 3) School principals are advised to use the results of this research as a support for teacher learning resources in improving the quality of learning by creating fun learning in schools. 4) Further researchers are advised to use the results of this study as a reference to carry out studies with similar methods/techniques.

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