

## Improving Understanding of Mathematical Concepts through Direct Learning Models for Elementary School Students

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**Abstract:** Understanding the concept of mathematics is very important for elementary school students because it is the basic foundation of learning. The direct learning model is one way to help improve students' understanding of concepts. This study aims to determine the increased understanding of mathematical concepts through direct learning. Researchers took samples from class II A MI Baitul Mukminin students. Researchers obtained data from observations, interviews, and learning outcomes. Researchers used test instruments in the form of pre-test, post-test to measure students' level of understanding. The results showed that learning mathematics through the Direct Learning Model could improve students' understanding of mathematical concepts in class II A at MI Baitul Mukminin Jati Kudus. This increase was evident in the test results and how students worked on practice questions. In the pre-test questions, there were 15 students whose scores were below the Minimum Completeness Criteria. In the exercise the researcher gave, there were 11 students whose scores were below the Minimum Completeness Criteria. Then in the post-test, there were only five students with scores below the Minimum Completeness Criteria 31 students in class II A. This score showed that students could understand the material presented by the researcher through a direct learning model. There is a significant difference between students' understanding of the pre-test and post-test.

**Keywords:** Learning Model, Direct Learning, Understanding Mathematical Concepts

### INTRODUCTION

Understanding a concept in mathematics is an important basis for students to like mathematics (Godino, 1996; Yuliandari & Anggraini, 2021). According to Kilpatrick, understanding concepts in mathematics is important because mathematics contains interrelated concepts (Chappell & Killpatrick, 2003). According to Hermer and Trueblood, mathematical concepts are arranged in a hierarchy, meaning that one concept becomes the basis for the next concept (Schmidt & Hermes, 1973). Herman Hudoyo believes that you must first understand Concept B to learn Concept C from Concept B. If you understand Concept B, it's possible to understand Concept C (Hudoyo, 1990). That is, learning mathematics must be done gradually and based on experience. The view above shows that learning mathematics must continue from the most basic concepts to the most advanced concepts. Creating an experience for students can be done by giving examples of questions and directing students to work on them based on the understanding they know from the material explained by the teacher. If students do not understand concepts well, they will not be able to follow procedures to solve problems. So efforts to increase the understanding of elementary school students' mathematical concepts must

be prioritized. This effort is important because several studies have shown unsatisfactory results in learning mathematics at school (Ridayati dkk., 2022; Utari dkk., 2019; Yeni, 2015).

Increasing students' understanding of concepts in learning mathematics can be improved through direct learning models (Sakti, 2013). The direct learning model is a teaching model that helps students pursue and understand basic skills and obtain step-by-step information (Hiemstra & Brockett, 2012; Jacobs & Michaels, 2007). This model was created to support learning processes related to well-organized procedural and declarative knowledge. Procedural knowledge is in the form of knowledge to do assignments and how students act before doing something (Novferma, 2016). At the same time, declarative knowledge is explaining and telling a material or information. The direct learning model allows students to learn by observing in detail and selectively, imitating and remembering the teacher's message. Therefore, the mandatory thing to be considered when applying the direct learning model is to avoid giving convoluted knowledge.

Based on the results of observations and interviews at MI Baitul Mukminin Jati Kudus with the class II homeroom teacher, Mrs. Allisa Aliyatul Muna, S.Pd. in mathematics subject matter of weight measurement, there are still some obstacles. The researcher found that some children did not understand the unit of weight. Some thought for a long time before being able to answer questions from the teacher. If they were given a different problem from the example, students still experienced confusion in solving it. Based on direct observation in class II A, researchers also found that the teacher needed to use the suitable learning model because they still needed to use conventional learning models (lectures, questions, answers, assignments) in learning mathematics. To overcome the problem of inaccurate learning that has been done, researchers use direct learning models to increase students' understanding of mathematical concepts.

The direct learning model has been proven to improve students' understanding of concepts. This is similar to the results of research conducted by Indra Sakti, which states that animation media's influence in the Direct Instruction Model influences students' understanding of physics concepts at Bengkulu City Public High School by  $d = 24\%$  (Sakti, 2013). In addition, Agung Putra Wijaya also stated in research that the learning model affects the mathematical understanding of students with a field-dependent cognitive style (Wijaya, 2016). Fakhrah also said that there was an increase in the understanding of concepts and science process skills of students who were taught using the direct instruction learning model with students who were taught using conventional learning models (Fakhrah, 2015). Therefore, this study also examines improving elementary students' conceptual understanding through direct learning. This research differs from the previous one because it focuses on teaching mathematics in elementary schools.

## **METHODS**

The subjects of this study were Class II A MI Baitul Mukminin Loram Jati Kudus students, totaling 31 students with ten boys and 21 girls. The researcher collects data using observation and documentation and contains scores from the results of the pretest and posttest questions. The method used in this research is quasi-experimental (Maciejewski, 2020). The research design used a pretest–posttest control group design. This design uses one class as the research subject. Students work on pretest questions before students are given treatment in the form of a direct learning model. Then, after being given the direct learning model treatment, students worked on the posttest questions. The results of the pretest and posttest values were analyzed to determine a significant increase in mathematical understanding through the direct learning model.

## RESULT AND DISCUSSION

### 1. Application of the Direct Learning Model to Improve Understanding of Mathematical Concepts for Class II Students at MI Baitul Mukminin Kudus

In applying the direct learning model in class II A MI Baitul Mukminin Jati Kudus, it has gone well and is structured. Because a class II A mathematics teacher assisted the researcher as an observer in applying the learning model, the observation activities used observation instruments that the researcher had made. By the results of the observation instrument, the researcher has implemented a learning model (direct learning) to improve students' understanding of mathematical concepts properly and sequentially according to the planning for executing the learning model previously planned by the researcher.

In the learning process, the researcher used the Direct Learning model steps according to Bruce and Weil (Joyce dkk., 1986), which are as follows:

#### a. Orientation

- 1) Preliminary activities, namely exploring knowledge related to students' understanding. At this stage, the researcher conducted an apperception to explore students' knowledge about the material to be studied today.
- 2) Formulate or explain learning objectives. After the apperception, the researcher explained the learning objectives to the students.
- 3) Explain/give direction regarding the activities to be carried out. Then the researcher explains the series of learning activities that students will carry out. Namely, students listen to the teacher's explanation, and students pay attention to sample questions and explanations about how to solve these problems with the participation of students, ask the teacher if they do not understand the material being studied, follow guided exercises or independent exercises according to instructions from the teacher.
- 4) Explain the material/concept to be taught and the activities to be carried out during learning. She was alluding to material from examples in everyday life before entering into the core material and explaining the learning activities for the day.

#### b. Presentation

The teacher provides an explanation of the material in the form of concepts and skills.

- 1) Presentation of material in small steps so that students can master the material quickly. At this stage, the teacher explains the material gradually and then gives practice before moving on to the following material.
- 2) Providing examples of concepts. The examples of concepts conveyed by the teacher here are examples of word problems and provide examples related to everyday life within the scope of the material.
- 3) Avoiding digression (unilateral decision making). At this stage, the teacher invites students to discuss determining the correct answer and explains to students how to find the right answer.
- 4) Re-explaining complex material. Then the teacher checks students' understanding by throwing a few questions orally; if students have difficulty answering, the teacher will explain briefly again.

#### c. Structured exercise

The teacher directs students to carry out the exercise. The role of the teacher in this phase is to provide feedback on student responses and provide confirmation of student responses that are correct and correct student understanding that needs to be corrected.

d. Guided practice

Teachers provide opportunities for students to practice concepts or skills. Teachers can use this guided exercise to assess students' abilities in carrying out their duties. In this phase, the teacher monitors and provides guidance when needed.

e. Independent practice

In this phase, students carry out training activities independently; this phase can be passed by students when they can master the stages of carrying out assignments 80% -90% in the guidance exercise phase. The teacher provides feedback at the end of the independent exercise that students have done. Independent practice can be in the form of homework or questions made by the teacher himself.

The direct learning model provides opportunities for students to learn by observing in detail and selectively, imitating and remembering what the teacher says (Asri dkk., 2022). Therefore, paying attention when implementing the direct learning model is mandatory, namely avoiding conveying material that is too convoluted. This theory is by the direct learning that the researcher applies; in applying the learning model, the researcher says the material briefly and reproduces exercises to find out students' understanding of the material being studied. The researcher also provides songs according to the material to make it easier for students so that it is easy to remember and understand the mathematics material being taught and direct students to imitate and remember the songs.

When studying mathematics, it is important to make connections between students' previous learning experiences and the concepts they want to learn (Anggraini, 2019; Godino, 1996; Perdana & Suswandari, 2021; Van de Walle dkk., 2014). In mathematics, each concept is related to other concepts. Therefore, students should be given more opportunities to carry out these relationships. In this case, the researcher explains the relationship between the material being studied and the previous material by giving students examples of material related to everyday life.

In conducting classroom learning, the researcher applied the learning model for three meetings with 3 lesson plans; in the first lesson plan, the researcher focused on delivering material and using the learning model, and giving pretest questions to students; in the second lesson plan, the researcher applied the model and instilled the concept of Mathematical material and carried out exercises and evaluation, for the RPP the three researchers focused on checking students' understanding of concepts, providing independent exercises and giving post-test questions as the final evaluation in the application of the direct learning model as well as to see how far the students' understanding of Mathematical concepts was. In learning in class, students are also very enthusiastic about participating in learning activities and responding to researchers when researchers invite students to discuss.

## **2. Improving Understanding of Mathematics Learning Concepts through Direct Learning for Class II Students at MI Baitul Mukminin Kudus**

The understanding of class II A students at MI Baitul Mukminin, Jati Kudus, about mathematics subject to Standard Weight Units began to increase after the researcher applied the direct learning model, which can be seen in the pre-test results, exercises, and post-test scores of class II A students. In the post-test questions, student scores increased when compared to pre-test scores; in the pre-test questions given by the researchers, there were still 15 students whose scores were still below the KKM, and in the post-test questions presented by the researchers, there were only five students whose scores were still below the KKM of 31 student in class II A. This shows that students' understanding of the material being taught has increased.

The following are four indicators from Fitri Romansyah used in this study to measure low-grade students' understanding of mathematical concepts (Romansyah & Nurhamdiah, 2018):

**a. Students' ability to re-explain concepts that have been learned**

Class II A students of MI Baitul Mukminin Jati Kudus have been able to re-explain the material that has been taught by the teacher so that they are also able to explain and answer questions given by the teacher orally when teaching and learning activities in class take place.

**b. Students can make examples of the material that has been studied**

After applying the learning model (direct learning) for class II A MI Baitul Mukminin Jati Kudus, they know and understand how to make sample questions, both story and essays, from material taught independently. This statement is by the guided exercise given by the researcher to class II A students to make questions and exchange them with other friends to work on.

**c. Students' ability to show concepts in mathematical representations**

Most students in class II A are self-confident and can express their ideas about learning materials. Judging from students' enthusiasm in responding to researchers when teaching and learning activities took place, class II A students could represent their ideas from the material being studied.

**d. Students can apply concepts to solve a problem**

From applying the learning model (direct learning) to improve understanding of mathematical concepts, most students in class II A MI Baitul Mukminin can apply the concepts they learn to solve problems given by researchers. So besides knowing the answer, they also understand how the solution is to solve the problem so they can find the correct answer.

The following is a table of increasing students' understanding of mathematical concepts:

**Table 1**  
**Indicators of increasing understanding of students' mathematical concepts**  
 (Romansyah & Nurhamdiah, 2018)

Concept Understanding Indicator	Initial Conditions	Final Condition
The ability to re-explain concepts that have been learned	Most students still cannot answer questions from the teacher, students also feel that they still have difficulty explaining what they have learned	Most of the students were able to re-explain the material that had been taught by the teacher, so they were also able to explain and answer questions given by the teacher orally.
Able to make examples of the material studied	Before using the learning model, many students do not understand how to make examples or	After applying the learning model ( <i>direct learning</i> ) students know and understand how to make sample questions,



<b>Concept Understanding Indicator</b>	<b>Initial Conditions</b>	<b>Final Condition</b>
	questions independently and still need guidance from the teacher.	both story problems and essays from material taught independently.
Ability to show concepts in mathematical representations (expressions/ideas).	The courage of students in expressing understanding of concepts in learning Mathematics is still lacking, this happens because students have not been able to understand the material being studied.	Most students already have good self-confidence and can express their ideas about learning materials.
Able to apply the concept to solve a problem	Some students have not applied a way to solve problems coherently, they only know the results but do not know the right way to solve them.	Most students have been able to apply the concepts they have learned to solve the problems given by the researcher. So besides knowing the answer they also understand how the solution to solve the problem.

## CONCLUSIONS

In applying the direct learning model to class II A Mathematics at MI Baitul Mukminin Jati Kudus, there are five stages of learning steps applied: orientation, presentation, structured exercises, guided exercises, and independent exercises. In conducting classroom learning, the researcher applied the learning model for three meetings with 3 lesson plans. In the first RPP, the researcher focused on delivering material and applying the learning model, and giving pretest questions to students; in the second lesson plan, the researcher applied the model and instilled the concept of Mathematical material and carried out exercises and evaluations; for the third RPP, the researcher focused on checking students' understanding of concepts, giving independent practices and giving post-test questions as the final evaluation in applying the direct learning model as well as to see the extent to which students understood Mathematical concepts. In learning in class, students are also very enthusiastic about participating in learning activities and responding to researchers when researchers invite students to discuss. The understanding of class II A students at MI Baitul Mukminin, Jati Kudus, about mathematics in the Standard Weight Unit material increased after the researcher applied the direct learning

model, which can be seen in the results of the pretest, practice, and post-test scores of class II A students. There are four indicators to measure understanding of mathematical concepts in low-grade students, namely a) Students' ability to re-explain concepts that have been learned; b) Students ability to make examples of the material they have learned; c) Students' ability to show concepts in mathematical representations; d) Students can apply concepts to solve a problem. The researcher recommends that researchers be able to develop the application of direct learning models more actively and creatively, both in Mathematics subjects and in other topics, according to the needs of students.

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