



Effectiveness of Guided-Discovery and Instructional Media on Early Mathematical Skills

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Abstrak

Early mathematics skills are basic skills that children need to have to adapt to the external challenges of the 21st century. To empower early mathematical abilities, the guided discovery method works effectively. The objective of this study is to find out the effectiveness of guided discovery and instructional media toward early mathematics skills kindergarten student. This research was a quasi-experimental. The instrument for obtaining data on children's early mathematical abilities is the observation sheet of early math abilities. The sampling technique employed was the multi stage random sampling method. The study was conducted on kindergarten children in West Java Province, Indonesia. The results showed that there were significant differences from guided discovery and instructional media to children's mathematical abilities.

INTRODUCTION

Children are assets of a nation and education. They are nation's long-term investment. A nation can invest in children by making teachers develop active learning activities for young learners using various learning approaches and media instructional.

Mathematics has a big influence on people's life as it exists in many aspects of life. The success of ones' mathematical skills is greatly influenced by their mathematical mastery.

Therefore, it is important for children to be introduced to mathematics and make it part of their life. It is also important not to force them to learn mathematics, but make it challenging and interesting. In order to achieve this, proper strategies and media instructional are needed.

Based on the research by the Organization for Economic Cooperation and Development (OECD) carried out in the 2012 Program for International Student Assessment (PISA) to children under 15 years old, Indonesian children's mathematical skills were still unsatisfactory.

Indonesia was ranked 64th out of 65 countries in mathematics, science, and reading. To address this issue, this study tested the effectiveness of inquiry-discovery learning and games using blocks and flashcards in improving the basic mathematical skills of young learners.

Teachers make various efforts to overcome young learners' displeasure and to increase their interest in learning mathematics by including different strategies. A strategy is as "a plan, method, or series of activities designed to achieve a particular educational goal". Soejadi (1999) argues that "A learning strategy is a way to carry out learning activities that aim to change an existing learning condition into an expected learning condition.

A variety of learning approaches can be taken to make the changes". In other words, a learning strategy is a series of procedures for planning activities, which include the use of methods and various resources in a learning activity that is structured to achieve a particular learning goal. It includes specific approaches, models, methods, and learning techniques. Some examples of learning strategies are inquiry learning and discovery learning.

With these strategies, young learners learn mathematics by solving problems through block playing, where children are given a stimulus to put triangular, quadrilateral, pentagonal, or circular blocks into their respective places. Early math skills are a set of basic skills of young learners in applying mathematical concepts, including the

concept of (1) weight, length, size, and height; (2) objects categorization based on shape and color; (3) left-right and top-bottom; and (4) addition and subtraction.

Discovery is defined Teaching procedure prioritizing individual teaching, object manipulation and others, before reaching generalization. The method of discovery learning is a component of educational practice which includes teaching methods that promote active learning, process-oriented, self-directed, self-seeking and reflective.

The Discovery learning syntax:

1. Orientation
2. Problem Identification
3. Observation
4. Data Collection
5. Data Processing and Analysis
6. Verification
7. Generalization

The advantages of discovery learning:

1. Helping students to improve and improve cognitive skills and processes, (Salo, 2016)
2. Increase student learning activeness, (Salo, 2016)
3. Improving student outcomes and learning processes, reducing learning services is input for colleagues in an effort to improve student learning outcomes, (Masitoh, 2016)
4. Develop students' critical thinking skills, (Tiana, 2015)
5. Improve student learning outcomes, (Atmojo, 2016)
6. Improve the ability to think science, emotional and cognitive, (Orr, 2016).

The inquiry learning model is a series of learning activities that emphasize critical thinking processes and analysis to find and find answers to a question in question.

The inquiry learning syntax :

1. Orientation
2. Formulate a problem
3. Summarizing the Hypothesis
4. Collect Data
5. Test the Hypothesis
6. Conclusion

The advantages of inquiry learning:

1. Increasing students' intellectual potential
2. Obtain investigative knowledge
3. Extend the memory process
4. Understand the concepts of science and ideas well
5. Student-centered teaching
6. Avoid students learning by memorizing
7. Teacher's questioning skills influence the implementation of meaningful learning proces-

ses.

8. Generate interest and curiosity and attention of students, diagnose special difficulties that hinder learning, develop active learning methods, encourage students to express their views in discussions and test and measure student learning outcomes (Ginanjar, Utari, & Muslim, 2015).

The purpose of this research is to investigate whether or not there is any influence of the application of guided-discovery and instructional media on early math skills of kindergarten.

METHOD

This research was quasi-experiment with 2x1 factorial design (Creswell, 2012). The study conducted in West Java Indonesia. Sampling uses purposive sampling. 36 students as an experimental class in the city of Bandung. 36 students as a control class in West Bandung Regency. The experimental class was a class taught with the Guided-discovery with blok instructional media, while the control class was taught with the Inquiry with flashcard instructional media. Observation of the child's early mathematical abilities was carried out first to ensure that the two research groups had balanced mathematical skills. The instruments employed in this research including learning activity work sheets and checklist early math skills. Data were analyzing using t test.

Table 1. 2x1 Factorial Design

Instructional Media	Learning Strategies	
	Discovery with blok instructional media	Inquiry with flashcard instructional media

RESULT AND DISCUSSION

The results of the t-test calculation are as follows:

Table 2. t-test results

Grup	Mean Score Before	Mean Score After
Discovery with blok instructional media	88,14	116,86
Discovery with blok instructional media (Experiment)	87,86	101,42
Inquiry with flashcard instructional media (Control)		
T-Test Result	0,16	6,08

From the table above the class average value for the experimental class before treatment 88,14 while for the control class 87,86 with a t test value of 0.16. The class average value for the experimental class after treatment 116,86 while for the control class 101,42 with a t test value of 6,08 (Sig. 0,00). This means that there are differences between the experimental and control classes.

The results showed that there were significant differences from guided discovery and instructional media to children's mathematical abilities.

Based on the main purpose of discovery learning and the results of this study, it can be said that discovery learning is very effective in improving young learners' early math skills. This is consistent with Glasson (Santrock, 2009) stating that "Students who participate in discovery-based activity learning scored higher on science subject than students in science classes with a traditional direct teaching".

Above all, as synthesized from Presseisen (2001) and Arsyad (2005), which is also supported by Sari and Abdullah (2016), innovative mathematics learning activities, especially in terms of the media, had greater student learning outcomes potential. The advantages of discovery learning make it possible to be used as an alternative in improving young learners' early math skills in kindergarten due to the fact that young learners in this stage need guidance and direction in the learning process.

In addition to being able to improve their early math skills, the use of discovery learning can make young learners to be more active in the learning processes, which is appropriate to the development stage of children at an active age, in exploring the environment around them.

This is in line with the research results of Yulida et al. (2016) on the use of Guided Discovery learning in improving learning activities and outcomes; Martin, Rebecca B. Cirino, Paul T. Sharp, Carla, Barnes, and Marcia (2014) on number skills of kindergarten students, specifically on the ability of kindergarten students to predict mathematical results in first grade elementary school; and Istikomah (2014) and Susilowati (2015) on the development of discovery learning devices for science learning in kindergarten.

In addition, the research results of Tindanzen and Vandalita (2016) on the development of inquiry-based learning tools to improve conceptual understanding, problem solving ability in learning biology describes the main cause of the problem in learning activities that occur in science subject in junior high school and biology subject in high school is that the practicum activities carried out as

part of the learning has never been applied as part of the hypothesis verification despite it being one step in the syntax of inquiry learning.

Finally, a research conducted by Salo (2006) found that discovery learning can improve the activeness of students in learning.

CONCLUSION

Based on the above discussion, the following conclusions have been drawn: guided-discovery learning could improve young learners' early math skill, block media instructional could improve young learners' early math skill, guide-discovery learning with blocks improved young learners' early math skill, there was an interaction effect of the learning strategies and instructional media on young learners' early math skill.

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