



The Analysis of Understanding Level of Students with Visual Impairment towards Flat Shapes Material

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<http://dx.doi.org/10.18415/ijmmu.v8i10.3023>

Abstract

This study aims to analyze the level of understanding of the 5th grade students with visual impairment of elementary school towards learning mathematics, especially on the flat shapes material at 10 Special Schools around Solo. This method uses a quantitative descriptive approach, with the research subjects of 15 students from 10 SLB Solo Raya. Data collection techniques used written tests and interviews. Data analysis used quantitative descriptive analysis techniques. The results of this study indicate that the understanding of visually impaired students to the learning material of flat shapes is still low. From 7 indicators of the level of understanding of students with visual impairment towards flat shapes material, the data shows that there are still many who have difficulties. It is occurred due to the lack of flat shapes learning media and conventional learning methods. Therefore, more innovative learning media are needed.

Keywords: *Visual Impairment; Elementary School; Flat Shapes*

Introduction

Learning mathematics is a students' process of connecting the material learned with their understanding. Mathematics is one of the most basic knowledge that is very important to be learned (Mursalin, 2016; Farah, 2018; Indriani, 2019). Learning math is learning that emphasizes the understanding of basic concepts, understanding of concepts and skills development of mathematical ideas, academic, social and affective in order to interpret problems in life. Learning mathematics helps us to develop logical, analytical, systematic, critical, creative thinking power and develop habitual patterns of working together in solving problems (Farah, 2018; Indriani et al., 2019).

Learning mathematics is the knowledge to know and apply basic mathematics in everyday life. In the 21st century, mathematical skills are used as the ability to solve problems that exist in the real world so students must have good mathematical abilities (Pratama, et al: 2018). The material in mathematics has an effect on life, one of which is in the field of geometry. Everything in this world has a shape and distinctive characteristics relating to the geometry in the field of mathematics. Through understanding in the field of geometry, we can find out the types of flat shapes, the shapes, and their characteristics. Geometry is important to learn as it aims to recognize the shape of the surrounding environment, the development of relations between two-dimensional objects in three dimensions, and the forms of various

viewpoints (Indriani et al: 2019; Arifani, et al: 2019). In studying geometry, the sense of sight plays a very important role. By looking at something, someone can distinguish the different types of forms. The learning of visually impaired students differs from students without visual impairment in terms of their learning styles and learning needs (Bilal, 2017; Kizilaslan, 2020). For normal students, distinguishing various types of flat shapes is not difficult, but it is different for students with visual impairment. This is in line with the statement of Saksono (2020) and Nisa (2018) which said that geometry is one of the mathematical materials that is considered difficult for students with visual impairment.

People with visual impairment have difficulty in the learning process because of the inability of students with visual impairment to function their sense of sight. The loss of the sense of sight will have an impact on differentiation in concept development (Zahra et al: 2017). Students with visual impairment are those who have impaired vision due to disease, damage or abnormalities that impact on the educational process and thus require special assistance which may be material, exercises, tools or other assistance. Bilal (2017) states that the blind have limitations in their sense of sight which result in learning limitations because they do not have the impression, perception, understanding, memory, and visual understanding of an object. Because students with visual impairment have limitations in the whole concept-making process, they get difficulties in almost every learning process in class both in remembering and understanding.

The limitations of students with visual impairment require them to develop other senses to support their learning process. In the process of learning mathematics, the students are strongly influenced by the sensitivity of educators in adapting learning so that the learning process can be adapted to the characteristics of students with visual impairment. Osterhaus in Subagya (2020) explains that one of the challenges in teaching mathematics to blind children is teaching concepts that involve two and three dimensional objects. Educators are required to have varied learning methods to improve students' understanding of the material.

Mathematics lessons are a difficult thing for students with visual impairment because mathematics really needs an understanding of concepts and symbols, including understanding the types of flat shapes. Klingenberg et al (2019) stated that the concepts of big, long, and range can be understood by children who can see because sight helps them group objects according to their overall similarity. Meanwhile, students with visual impairment can only see the relationship between objects at a glance although an understanding of flat shapes is very important for every student. For them, such object relations are mental, because only their hand can touch or explore an object. Based on the explanation above, this study aims to analyze the level of understanding of visually impaired students towards learning mathematics, especially in the matter of flat shapes.

Method

This study uses a quantitative descriptive method. The subjects in this study were 15 students with visual impairment. The research was conducted in 10 Special Schools around Solo such as SLB Negeri Surakarta, SLB YKAB Surakarta, SLB YAAT Klaten, SLB Negeri Boyolali, SLB Sukoharjo, SLB Negeri Colomadu, SLB ABCD YPALB Cepogo, SLB Negeri Karanganyar, SLB Negeri Sragen, and SLB Negeri Wonogiri. The period of this research was conducted for two months from March 2021 to April 2021.

The sampling technique used purposive sampling where the students with visual impairment have same characteristics. The data collection technique in this study used a written test to determine the level of understanding of the visually impaired students towards spatial shapes. The results of the written test were deepened by interviews with classroom teachers. Data analysis used quantitative descriptive analysis techniques by analyzing the data and interpreting it in the form of graphs and descriptive to conclude.

Result and Discussion

Result

It is important for students to study geometry because it is related to their life. Knowledge of geometry in the material of flat shapes has a purpose to make students able to recognize shapes from the surrounding environment. The following obtained data are about the level of understanding of the students with visual impairment towards the flat shapes material:

Table. 1 Level of Understanding of Visually Impaired Students towards Flat Shapes Material

Indicator	Very Easy	Easy	Moderate	Difficult	Very Difficult
Understanding towards flat shapes	7%	13%	13%	27%	40%
Students' ability to classify objects according to the properties of flat shapes	0	0	27%	40%	33%
Students' ability to give examples and non examples of the concept of flat shapes	0	7%	33%	40%	20%
Students' understanding in showing concepts in various forms of representations of flat shapes	0	0	20%	33%	47%
Students' knowledge in developing the requirements of flat shapes	0	0	13%	27%	60%
Using certain procedures or operations	0	0	6%	27%	67%
Applying problem solving concepts or algorithms	0	0	0	47%	53%

Table 1 shows that there are still many students with visual impairment who get difficulties in their understanding of the concept of flat shapes. There were 7% of the students found that it is very easy to understand the concept of flat shapes, 13% easy, 13% of students had moderate understanding, 27% of students experienced difficulties, and 40% of students experienced a lot of difficulties. In the indicator of the ability to classify objects according to the properties of flat shapes, students with visual impairment still have many difficulties. There are 27% of students had moderate ability, 40% of students got difficulties, and 33% of students got a lot of difficulties.

In the indicator of students' ability to give examples and non examples of the concept of flat shapes, many students with visual impairment still got difficulties. The abilities of visually impaired students as follows: 7% easy, 33% moderate, 40% difficult, 20% very difficult. Indicators of students' understanding in showing concepts in various forms of representations of flat shapes, the level of understanding is still low. There are 20% of students with moderate understanding, 33% of students got difficulties, and 47% of students got a lot of difficulties. Furthermore, on the indicators of student knowledge in developing the requirements of flat shapes. There are 13% of students who had moderate knowledge, 27% of students who had difficulties, and 60% of students who had a lot of difficulties.

The understanding level of students with visual impairment in using certain procedures or operations showed that many students have difficulty. There are 6% of students had moderate understanding, 27% of students had difficulties, and 67% of students had many difficulties. In indicators of applying problem solving concepts or algorithms, all students had difficulty. There are 47% of students had difficulties and 53% of students had a lot of difficulties.

The results on understanding level of the visually impaired students on the flat shapes material are supported by the results of interviews with classroom teachers who handle visually impaired students. The teacher explained that the understanding of visually impaired students on the material of flat shapes was still very low, students with visual impairment still had difficulty in distinguishing types of flat shapes, especially in square and rectangular shapes. Not all students are able to describe the form of a flat

in accordance with the nature and characteristics, especially associate with everyday concrete objects. Moreover, almost all students have difficulty in understanding in arithmetic operations on flat material and problem solving concepts.

The teacher stated that the students' difficulties in understanding the flat material were due to the lack of media or learning aids. The media used is not fully in accordance with the needs of students. In addition, conventional method based learning makes students less enthusiastic in participating in learning. Students tend to be bored if the learning media only uses material books. The presentation revealed that the level of understanding of visually impaired students was still low and the media or innovative aids used in learning flat shapes were minimal. In addition, the methods used by teachers were not optimal.

Discussion

Based on the results of the study, it was shown that the level of understanding of the visually impaired students on the flat shapes material was still low. From the five indicators of the flat figure concept, many students with visual impairment have difficulty in the ability and understanding of the flat shapes material. This is in line with research conducted by Ardiantoro (2017) which shows that the skills of students with visual impairment in geometry are still low. In learning about flat shapes, students with visual impairment will use their sense of touch more. Like understanding a flat shape, they must be able to analyze each part of the shape carefully by using the sense of touch to find out the characteristics of each flat shape. In addition, some students with visual impairment argue that their difficulty in recognizing flat shapes is also due to the limitations of handbooks and learning media. This is in line with the statements of Sekarlintang (2020) and Nisa (2018) which state that educational media for children with visual impairment is still very minimal and sometimes not all media can be used for children with visual impairment. Therefore, the learning conducted by educators is also the main factor that supports the improvement of visually impaired students' understanding of the flat shapes material.

Based on the educator's statement, the learning of students with visual impairment is still not optimal. This is supported by research from Klingenberg, et al: (2019), which explains that students with visual impairment experience different obstacles in learning mathematics due to the lack of accessible materials designed to support the conceptual understanding of students with visual impairment in learning mathematics. The use and provision of the used media have not fully met the needs of students to be able to understand the content of the material and the evaluations conducted are more or less the same as those of visually impaired students so that the understanding of students with visual impairment cannot be measured and assessed properly.

Based on the results of the study, the low understanding of visually impaired students on the material of flat shapes raises a new need for educators to create a learning media that can solve these problems. Similar to normal students, students with visual impairment have the right to obtain education and educational support facilities, but educational media for students with visual impairment in Indonesia is still very limited (Sekarlintang, 2020). An innovation that aims to facilitate and optimize student learning in class in receiving material is needed.

For the efforts and solutions from schools to solve the problem of the low level of understanding of students with visual impairments on the flat shapes material, the school may use the application of technology-based learning media. Relevant research by Pitchford, et al. (2018) explained that the interactive media and digital technology are effective to improve learning on students with special needs. This research is in line with research conducted by Klingenberg, et al: (2019), where the use of audio based interactive e-learning and tactile can improve the mathematical skills of students with visual impairment. Therefore, the media for students with visual impairments in learning the material need to be modified according to the needs of students.

Conclusion

Based on the analysis of the research results, it is shown that the level of understanding of the fifth grade visually impaired students at Special School around Solo is still low. From the collection of data obtained by researchers using a written test, the results of 7 indicators indicate that students with visual impairment have difficulty in understanding the material of flat shapes. It is occurred due to several factors including the lack of learning media and innovations provided by educators in delivering spatial shapes materials. Thus, it is necessary to have an innovative learning media that can help students with visual impairment to improve their understanding of the flat shapes material.

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