

THE USE OF FLAT STRUCTURE PUZZLES TO IMPROVE FINE MOTOR ABILITY IN STUDENTS WITH VISUAL DISABILITIES

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Abstract

This study aims to determine the process of learning mathematics in students with visual disabilities. Researchers use the experimental method, where the experimental method is part of the quantitative method. Data collection uses a questionnaire to find out the results of learning mathematics in students with visual disabilities. The subject of this study was one of the 3rd-grade students at special education school SDLB Purwosari Kudus who has special needs and is visually impaired. The results of the study show that in the process of teaching activities, the teacher only provides material and the teacher does not provide examples of learning media to students. Students with visual disabilities have difficulties in mathematics lessons, where the teacher only explains the material to students in the process of teaching and learning activities, but students have a high curiosity and enthusiasm for the material being taught. Meanwhile, the limitations of learning media and school facilities are inhibiting factors in teaching and learning mathematics for students with visual disabilities. Seeing these conditions, the researcher chose the Flat Puzzle learning media.

Keyword: *students with visual disabilities; mathematics; flat structure puzzle*

Abstrak

Penelitian ini bertujuan untuk mengetahui proses pembelajaran matematika pada siswa penyandang disabilitas visual. Peneliti menggunakan metode eksperimen, dimana metode eksperimen merupakan bagian dari metode kuantitatif. Pengumpulan data menggunakan angket untuk mengetahui hasil belajar matematika pada siswa tunanetra. Subjek penelitian ini adalah salah satu siswa kelas 3 SDLB Purwosari Kudus yang berkebutuhan khusus dan tunanetra. Hasil penelitian menunjukkan bahwa dalam proses kegiatan mengajar, guru hanya memberikan materi dan guru tidak memberikan contoh media pembelajaran kepada siswa. Siswa tunanetra mengalami kesulitan dalam pelajaran matematika, dimana guru hanya menjelaskan materi kepada siswa dalam proses kegiatan belajar mengajar, namun siswa memiliki rasa ingin tahu dan antusiasme yang tinggi terhadap materi yang diajarkan. Sementara itu, keterbatasan media pembelajaran dan fasilitas sekolah menjadi faktor penghambat dalam proses belajar mengajar matematika bagi siswa penyandang disabilitas netra. Melihat kondisi tersebut, peneliti memilih media pembelajaran Flat Puzzle.

Kata Kunci: siswa penyandang disabilitas visual; matematika; teka-teki struktur datar

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PENDAHULUAN

(Slameto, 2015) states that learning is an activity in which teachers and students carry out interaction in an overall change, and becomes one of the results of experience in interacting with the environment. Education is very necessary because education is a means to gain knowledge. The beginning of improving the quality of education is increasing learning in students.

A special education school is an institution in the field of formal education that is specifically designed for students who have difficulty following the learning process. Where many students have physical disabilities or physical, emotional, and mental retardation disabilities. Such students are usually called children with special needs. Special education schools can help students to develop the potential, talents, and interests they want (Jaya, Haryoko, & Suhaeb, 2018).

Children with special needs or extraordinary children are children who are less than the average normal student in terms of mental characteristics, sensory, physical, and neuro-muscular abilities, social and emotional behavior, communication skills, or combinations, or combinations two or more of the things above, they require modification of school assignments, learning methods or services, which must be shown to develop their potential or capacity to the fullest (SARTIKA & ANDAJANI, 2018).

One type of student with special needs is a student with visual disabilities. Visually disabled people are individuals who have obstacles or damage in sight (Wikasanti, 2014). Because there are obstacles in vision and the malfunctioning of the sense of sight, the introduction or understanding of the outside world students cannot be obtained completely intact. The sense of sight plays an important role in the process of forming understanding or concepts (Rumelhart, 2017). Children with visual disabilities often use words that they don't know the true meaning of, because their knowledge is only limited to verbal vision (Phutane et al., 2022). Because of this, the language development of students with visual disabilities is slightly behind when compared to students who are alert or normal.

Visual disabilities are a limitation of physical conditions, namely the barriers to the sense of sight in carrying out all their daily activities (Maryanti, Nandiyanto, Hufad, & Sunardi, 2021). People with visual disabilities can only use their sense of smell, smell, hearing, and touch in carrying out their daily activities (McLinden & Mccall, 2016). So that students with visual disabilities often get incomplete information about an object, and the variety of experiences gained by students with visual disabilities is not as complete as normal students. Basically, students with visual disabilities are the same as other students in general, such as their physical and spiritual needs, but what distinguishes students with visual disabilities from other students is the disorder or limitations of their physical condition.

Some common conditions that can cause blindness, are albinism, amblyopia, color blindness, German measles (rubella), injury or trauma, radiation, vitamin A deficiency - xerophthalmia, glaucoma, cataracts, congenital eye disorders, myopia or near vision, nystagmus, ophthalmia neonatorum, corneal disease and corneal grafts, retinitis pigmentosa, diabetic retinopathy, retinopathy of prematurity, retinal tears, and detachment, strabismus, and trachoma.

Students with visual disabilities are some students with special needs who need special attention. Based on their ability to see, visual disabilities are divided into 2 parts which include total blind, or what is often called total blind, and those who still have residual vision, or what is often called low vision (Ardhi, 2013). As a result of limited vision, these students need education to optimally develop the talents and potential of these students.

Learning mathematics is essentially learning that provides knowledge and skills to children. Mathematical activities can be carried out in various ways according to the teacher's ability to deliver. However, basically, this activity is carried out by conducting experiments or experiments. Students in carrying out experimental activities can be carried out in a simple way and by utilizing learning media, for example, such as puzzles as a learning resource. Children do experiments from simple things that exist in school.

Mathematics subjects are often considered by students as a subject that is very difficult for them to understand. Where there is a lot of memorization of formulas with various numbers, which can affect incomprehension in mathematics. The space for interaction between students and teachers is also limited, considering that subjects in elementary schools are not only mathematics. So, it requires teacher innovation in creating interactive and fun learning.

Based on the results of observations that were held at the special education school, SDLB Purwosari, it was found that students with visual disabilities had difficulty learning mathematics, where the teacher only explained the material to students in the process of teaching and learning activities, but students had curiosity and high enthusiasm for the material being taught. Meanwhile, the limitations of learning media and school facilities are inhibiting factors in teaching and learning mathematics for students with visual disabilities.

Seeing these conditions, the researchers chose the 3D Flat Puzzle learning media. So that 3rd students at special education school SDLB Purwosari can find out what the shapes are in a flat shape by holding the learning media.

METODE PENELITIAN

This study aims to analyze the learning process of students in mathematics subject with flat structure material for students with visual disabilities using a type of experimental research, where the experimental method is included as part of the quantitative method. The data taken were in the form of interviews, observation notes, and questionnaire results obtained in the field. Retrieval of data using observation techniques, interviews, and questionnaire results with teachers who have accompanied

students with visual disabilities. What events are faced by students are then described in an experimental approach.

One of the learning methods that can be used in learning activities for elementary school children is the experimental method. The experimental method is a method of providing opportunities for students to be trained in carrying out a process or experiment. (Bahri Djamarah, 2000), the experimental method is a teaching method that uses certain treatments and is carried out more than once, for example using learning media that are appropriate to the ongoing subject.

The advantages of the experimental method are as follows. First, this method can make students believe more in the truth or conclusions based on their own experiments than just accepting the words of the teacher or books. Second, students can develop attitudes to conduct exploratory studies (exploring). Third, this method will develop humans who can bring new breakthroughs with inventions as experimental results which are expected to be beneficial for the welfare of human life.

While the lack of experimental or experimental methods includes, First, not enough tools result in every student having the opportunity to conduct experiments. Second, if the experiment requires a long period of time, students must wait to continue learning. Third, this method is more suitable for presenting areas of knowledge and skills about learning mathematics so that students are able to master the material well.

In this approach, the researcher will present a questionnaire that will be given to students related to calculating the suitability of lessons with puzzle learning media on questions that have been asked by researchers to students with the following criteria:

Table 1. Questionnaire Results Criteria

Percentage (%)	Criteria
0-25	Not suitable for use in lessons
26-50	Suitable for use in lessons, but students do not understand the material
51-75	Suitable for use in lessons, students understand enough material but not completely.
76-100	Suitable for use and students are able to fully understand the material completely

The formula for calculating the criteria for the results of the questionnaire using a flat puzzle media can be described in the following way:

$$Q: \frac{\sum x}{\sum x_1} \times 100 \%$$

Information:

P = Percentages ought

$\sum x$ = The number of answers from students

$\sum x_1$ = Maximum number of values

This research was conducted at SDLB Purwosari Kudus 3rd grade for students with visual disabilities. The subjects in this study were homeroom teachers for grade 3, as well as

accompanying teachers and students with visual disabilities. While the object of research this time is the learning process of students in mathematics subject matter of flat shapes.

RESULTS AND DISCUSSION

Based on the results of observations and interviews with teachers and students that have been carried out by researchers in the process of implementing mathematics learning flat shape material for students with visual disabilities, the teacher first prepares a Learning Implementation Plan (RPP) using the Discovery Learning learning model. The teacher has also prepared learning resources, namely textbooks, and also videos taken from YouTube.

The data analyzed in this research is data about the concentration ability of children with special needs in mathematics learning material which is carried out through simple experimental methods for children with special needs at SDLB Purwosari with 2 students. This data was obtained from the results of the pre-test and post-test in one class which was given treatment in the form of an experimental method using learning media using puzzles.

Implementation of learning begins, with teachers who prepare students physically and psychologically. Psychologically the teacher prepares students to start learning by praying according to their respective beliefs led by one of the students. Then the teacher asked about the activities of students before going to school. This is done by the teacher so that students feel comfortable and relaxed before starting the learning activities to be carried out.

Learning activities in 3rd grade use the lecture method continuously. Where students can only listen to the teacher's explanation of the flat structure material. Students are asked to record any explanations that have been delivered by the teacher while digesting the material that has been studied. The mathematics learning media needed by students with visual disabilities is limited, in fact, it tends not to exist. Due to the lack of teaching aids, students find it difficult to learn mathematics which requires concrete objects to learn. The media used by students are only braille and leggo boards for counting because there are no other learning media for students with visual disabilities, especially for learning mathematics.

NO	STATEMENT	1	2	3	4
1	Students are able to understand the material provided by the teacher		√		
2	Learners can improve fine motor skills	√			
3	Students can follow the learning well		√		
4	Students can mention the name of the shape that has been delivered by the teacher	√			
5	Students can mention the properties of flat shapes	√			

Table.2 Questionnaire Before Using Flat Puzzle Media

Explanation:

1 = Very poor

2 = Deficient

3 = Good

4 = Excellent

Questionnaire Calculations Before Using Flat Puzzle Media:

$$Q: \frac{\sum x}{\sum x_1} \times 100 \%$$

$$Q: \frac{7}{20} \times 100 \%$$

$$Q: 35$$

Information:

P = Percentages ought

$\sum x$ = The number of answers from students

$\sum x_1$ = Maximum number of values

Based on the results of the questionnaire calculation above, the teacher conducted learning without media and before using the flat puzzle media, obtained a value of 30. Where it is suitable for use and students are able to understand the material completely. Then the researchers carried out new innovations in learning for students with visual disabilities in 3rd grade at SDLB Purwosari, where the researchers provided learning media in the form of Flat Puzzles. Students with visual disabilities can learn about flat shapes from the puzzle. So that students with visual disabilities can find out the names of these flat structures when the learning media is held, so they use their fine motor skills.

According to Indriana (2011), a puzzle is a game in which the way to play it is by assembling pieces to create a specified image. The way to use it itself is fairly easy, students are presented with a flat shape puzzle, if the puzzle given is still in a random state, the first step is that the participant's right hand can feel the shape of the sides and corners of the flat shape pieces they are holding, the second step is the student's left hand to feel the puzzle board the depth of the shape of the sides and angles is almost the same as the pieces held in the right hand, the final step is that students put together the pieces of the puzzle they are holding onto the puzzle board which has the same depth of sides and angles.

NO	STATEMENT	1	2	3	4
1	Students are able to use flat puzzles easily			√	
2	Learners can improve fine motor skills				√
3	Learners can feel the flat shape puzzle				√
4	Students can say the name of the flat shape according to the puzzle pieces that have been given by the teacher				√
5	Students can mention the properties of flat shapes according to the puzzle pieces that have been given by the teacher				√

Table.3 Questionnaire After Using Flat Puzzle Media

Explanation:

1 = Very poor

2 = Deficient

3 = Good

4 = Excellent

Questionnaire Calculations After Using Flat Puzzle Media:

$$\begin{aligned} & \frac{\sum x}{\sum x_1} \times 100 \% \\ & \frac{19}{20} \times 100 \% \\ & Q: 95 \end{aligned}$$

Information:

P = Percentages ought

$\sum x$ = The number of answers from students

$\sum x_1$ = Maximum number of values

Based on the results of the questionnaire calculation above, the learning carried out by the teacher after using the flat puzzle media obtained a value of 95. Where the flat puzzle media is suitable for use and students are able to fully understand the material.

The learning outcomes of students with visual disabilities who have used the flat puzzle learning media are that students can feel several pieces of the flat shape as a result of which students are able to feel the shape of the sides and corners of each flat shape. Just like a square shape with 4 sides and corners, it's different from a triangle with 3 sides and corners. Accompanied by the teacher, students are able to ask questions and find out what the names of flat shapes are. Students with visual disabilities can also name the shapes of objects around them.



Figure 1: 3D Flat Structure Puzzle

CONCLUSION

Based on the results of research conducted at special education school SDLB Purwosari Kudus and discussion in the process of learning mathematics for students with visual disabilities, learning is not going well, but the teacher is in accordance with the stages consisting of preparation, implementation, and evaluation. In preparation for learning, the teacher prepares textbooks and videos of flat shapes. The teacher does not prepare other learning media, because the limitations of manipulative learning media and

school facilities are an inhibiting factor in the learning process in mathematics for students with visual disabilities. Then the implementation stage, the teacher has prepared the students physically and psychologically. Prepare students to pray, and ask about student activities before going to school. The teacher uses the lecture method so the teacher often dictates to students repeatedly, where the teacher asks students to be able to understand the content of the learning material that has been explained. In the third stage of evaluation, the teacher gives assignments both orally and in writing to students so they can practice working on the material being studied.

Then the researchers made new innovations in learning mathematics, where the researchers provided learning media in the form of Flat Puzzles. Students with visual disabilities can find out the names of these flat shapes when the learning media is held, so they use their fine motor skills. The results of learning mathematics for students with visual disabilities who have used the flat puzzle learning media is that students can find out what the names of the flat shapes are. Students with visual disabilities can also name the shapes of objects around them.

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