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The Effect of Geoboard Media on the Skill of Understanding Two-Dimentional Figure on Children with Vision Impairments

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ABSTRACT

This study aims to determine the effect of using geoboard media on the understanding of two-dimentional figure for children who have visual impairments in the inclusion class of SLB Aisyiah Singaparna. The research approach used in this study is a quantitative approach with the Single Subject Research method and the A-B-A research design. The subjects in this study were students who had visual impairment at the early childhood level with the initials FSS who had difficulty understanding the concept of two-dimentional figure. The results of this study indicate that the mean FSS level at the baseline-1 stage (A-1) is 55.2%, then at the intervention stage (B) the mean FSS level has increased to 78.1% and the mean level in the baseline-2 phase (A-2) to 91.0%. As for the results of the analysis in conditions, it was found that the geoboard media had a positive influence where this was shown in the estimation of the direction of the trend, the trend of stability, the data trail, the level of stability and range, and the level of data change. Likewise with the analysis between conditions, it is described in the number of variables that are changed, changes in direction and effects, trends in stability, changes in levels, and data overlap. Based on these results, it can be concluded that geoboard media can be used as a medium to improve understanding of two-dimentional figure for students who have visual impairments at the early childhood level in the Aisyiah Singaparna SLB inclusion class.

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1. INTRODUCTION

Vision plays an important role in the acquisition of information from the environment. Barriers in vision affect one of the main channels of obtaining information from the environment (Rizos et al., 2016). Visual impairment results in learners with visual barriers gaining information by relying on other senses that are still functioning (Giese et al., 2022). Learners with visual barriers gain information and experience through touch, smell and hearing, while normal learners or in general gain experience through the senses of sight as a whole (Firat et al., 2021). The limitations of the visual senses are what result in the limitations of very diverse experiences, so learners need special strategies in understanding information (Pienta et al., 2017). These limitations make learners need some service principles that must be met in the learning process (Drake, 2015).

Hundhausen et al., (2017) identifies "three principles that provide guidance in this educational process for learners: (1) concrete experience; (2) unity of experience; (3) Learn by acting." The limitations of learners with visual barriers have an impact on the principles that must be met in the process of teaching and learning activities. The impact is not only on one subject, but all subject subjects that demand contribution from the sense of sight, one of which is teaching material in the field of mathematics studies.

Kartika et al., (2019) "The subjects of mathematics taught at the elementary level include three branches, namely arithmetic, algebra, or geometry. In contrast to arithmetic and algebra, geometry is a branch of mathematics that deals with points and lines. To understand the concept of geometric learning requires visual or visual ability, because learners develop a concept when they are able to classify or group objects and are able to associate names with specific groups of objects (Botana et al., 2015). Just like in the concept of triangles learners know that a triangle is a plane surrounded by three straight lines.

Morton (2013) Learners' understanding of the concept of triangles can be seen when they are able to distinguish various geometric shapes other than triangles. Learners who have good vision can easily recognize the shape of the triangle visually then the concept will be formed according to what he has seen (Hwang et al., 2021). However, for learners with visual barriers, to recognize an object can be done with senses other than sight such as sense of hearing, touch, smell, taste. Similarly, in forming the concept in children with visual barriers will have difficulty because the senses other than vision are often unable to observe and understand an object beyond physical range.

Marton et al (2013) "Also found that out of 120 Secondary School learners only 23% of the learners passed a test on geometry theorems. In a research journal it was explained that of the 120 high school students, only 23% of the learners passed the geometry exam. This study was conducted on students beware, and the numbers showed approximately 28 learners who passed the geometry exam from a total of 120 learners. This happens to normal learners who do not have Impairments in their vision, it can be imagined how difficult learners with vision barriers in studying geometry in math subjects.

Arinda (2019) The use of learning media will facilitate the learning process to achieve goals in learning, especially in math learning, especially for learners with vision barriers. The medium in learning serves as a companion means to translate abstract theories so that they are easy to understand. There are various kinds of learning media that can be used in facilitating math learning, one of which is geoboarding.

The above statement, supported by scientific publications from two researchers from North-West University and the University of KwaZulu Natal who examined the Effects of The Geoboard on Learner Understanding of Geometry Theorems. The study was conducted at two

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secondary schools with a sample of 50 learners. The results of this study stated that learners who had previously had difficulty in understanding geometric theorems, experienced an increase in understanding after the introduced of geoboard media. Bonyah and Larbi (2021) "Based on the findings the researchers recommend that Geoboards be introduced from primary school so that learners develop the skill to use it. Mathematics should be taught in a practical way and Geoboards offer that opportunity".

Arlinwibowo and Retnawati (2015) The above becomes the basis of researchers to conduct research by trying geoboard media, especially for understanding the concept of two-dimentional figure in learners with vision barriers. In this study the use of geoboard media can be one solution of various Impairments of learners including with vision barriers in learning. Based on the researcher's exposure above, researchers assume that the use of geoboard media can improve the ability to understand two-dimentional figure concepts in mathematical learning effectively. Researchers consider the need for this study to find out the influence of the use of geoboard media so that it can be used by learners with vision barriers in improving understanding of two-dimentional figure concepts.

2. METHODS

The research method used is quantitative research experimentation with the design of a single subject experiment (Single Subject Research). The design pattern of a single subject experiment used is the A-B-A design which has three stages, namely A-1 (baseline), B (Intervention), A-2 (baseline-2). Ray (2015) stated, that the A-B-A Design is one of the development of the basic design of A-B. The A-B-A design indicates a cause-and- effect relationship between bound variables and free variables see in **Figure 1**.

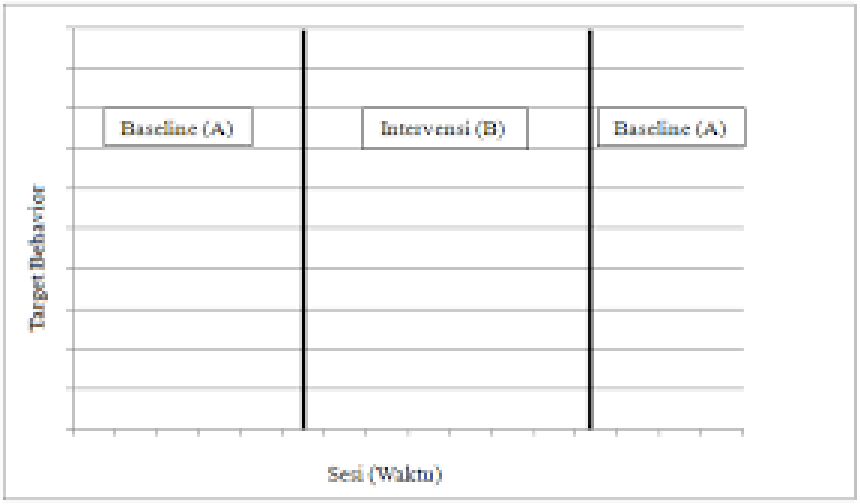

Figure 1. Basic Design Procedure A-B-A.

Description:

A-1: The initial condition of the ability to understand two-dimentional figure for children with vision barriers. Researchers conduct observations carried out continuously without giving any treatment.

B: The stage of intervention or treatment. At this stage the child is given special treatment using geoboard media to help improve the understanding of two-dimentional figure of children with vision barriers

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A-2: The condition of the child after intervention. The percentage results obtained are used as a benchmark for success and evaluation of interventions carried out.

Referring to Ganda (2015), that the steps that need to be done in this study are as follows:

a. Determining children with visible barriers to be used as research subjects, namely children aged 5-6 years SLB inclusion class Aisyiah Singaparna.
b. Baseline A1 is carried out before treatment to children with visual impairment using structured observation instruments that have been designed by researchers. At the baseline A1 there are as many as 3 meetings.
c. Intervention in the form of the application of Geoboard media to improve understanding of two-dimentional figure is carried out in children with vision barriers aged 5-6 years of SLB inclusion class Aisyiyah Singaparna. Intervention is carried out with a frequency of 7 meetings
d. Baseline A2 is carried out after intervention to children with vision barriers using structured observation instruments that have been designed by researchers as a learning evaluation. At the baseline A2 there are as many as 3 meetings.
e. Conduct an analysis of the data that has been obtained to see an increase in understanding of two-dimentional figure children by comparing the difference in the improvement of two-dimentional figure comprehension test results.

3. RESULTS AND DISCUSSION

The study also used analysis of conditions that included the number of variables changed, changes in tendencies and effects, changes in stability, changes in levels and overlapping data. The components of analysis between conditions are described in the following explanation:

3.1. Number of variables changed

The variables to be changed in this study from baseline-1 (A-1) to intervention phase (B), to baseline-2 (A-2) are just one i.e. two-dimentional figure understanding. The number of variables changed can be viewed through the following **table 1**:

Table 1. Number of variables changed

Ration Condition	**B/A-1 2:1**	**B/A-2 3:2**
Number of variables changed	1	1

3.2. Changes in directional tendencies and their effects

To determine changes in directional tendencies and effects are done by taking data on the summary of the analysis in the above conditions (up, steady, or down). The following is explained the change in directional tendencies and effects between conditions see in the **figure 2** and **table 2**.

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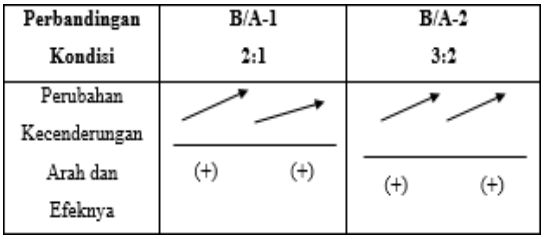

Figure 2. Changes in directional tendencies and their effects.

Table 2. level of change.

Perbandingan Kondisi	B/A-1 2:1	A-2/B 3:2
Level Perubahan	84,4%-59,4% (25%)	94,8%-84,4% (+10,4%)

Baseline-1 (A-1) to interventional (B) trending directions indicated in the intervention phase (B) is an increase, meaning that when given intervention using geoboard media, the understanding of two-dimentional figure learners has increased. Similarly, the intervention phase (B) to the baseline-2 (A-2) line indicates an increased direction, meaning there is an increase in understanding of two-dimentional figure up after being given intervention.

3.3. Changes in stability tendencies

Changes in the tendency of stability between conditions can be seen through the results of analysis in conditions. The change in stability tendency is to look at the tendency of stability of the subject's behavior in each of the baseline and intervention conditions. The following results of the analysis between the conditions of changes in stability tendencies are presented see in **the figure 3.**

Perbandingan Kondisi	B/A-1 2:1	A-2/B 3:2
Perubahan Kecenderungan Stabilitas	Stabil ke Stabil	Stabil ke Stabil

Figure 3. Changes in stability tends

Based on **Figure 3**. it is known that the change in the tendency of stability in the intervention phase (B) with a baseline – 1 (A-1) the result is stable to stable and in the baseline-2 (A-2) phase with intervention (B) the change in its stability tendency is stable to stable.

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3.4. Level of change

The level of change can be determined by calculating the difference from the last session score in the baseline-1 (A-1) phase with the first session score in the intervention phase (B). It is then marked (+) if it increases, (-) if it decreases, and (=) if there is no change. The level of change between conditions is described in the **Table 2**:

Table 2 shows that the change rate between the baseline-1 (A-1) phase with the intervention (B) and the intervention phase (B) with the baseline-2 (A-2) has increased.

3.4. DISCUSSION

The understanding of two-dimentional shapes in this study is divided into four sub-aspects consisting of sub-aspects of introduction, analysis, sorting and application.

The score obtained by students in baseline-2 which was carried out in three sessions on the indicator showing two-dimentional figure is 24 out of a total of 27, so the percentage obtained is 88%. Likewise, by mentioning the number of sides of a two-dimentional figure, students get a score of 49 out of a total of 54, so the percentage obtained is 90%. However, the indicator states that the corner points of the plane figure are 51, out of a total of 54, so the percentage obtained is 94%. The gain on the indicator distinguishes two-dimentional figure with various sizes as much as a score of 25 out of a total of 27, so the percentage obtained is 92%. In the indicator of sorting two-dimentional figure with various sizes, 21 out of a total of 27 were obtained, so the percentage obtained was 77%. While the indicator of sorting two-dimentional figure with other two-dimentional figure is obtained 27 out of a total of 27, so the percentage obtained is 100%. And finally, the indicator makes two-dimentional figure with various sizes of 65 out of a total of 27, so the percentage obtained is 90%.

This shows that the use of geoboard media is effectively used in improving the understanding of students who have visual impairments. This is evidenced by the acquisition of an average percentage of students 91.0% of the minimum completeness criteria that must be achieved.

After reviewing the overall results of data processing as a whole in each phase, the results of processing indicator data in the baseline-2 phase and the results of data analysis both data analysis under conditions and data analysis between conditions that have been discussed previously, the understanding of two-dimentional figure for students who have Impairments Vision showed an improvement after using geoboard media. This increase shows that the use of geoboard media has a positive and effective influence on the use of geoboard media in learning to get up and down for students who have visual impairments.

4. CONCLUSION

The program of mathematics learning activities, especially related to waking a child with vision barriers in SLB inclusion class Aisyiyah Singaparna by using geoboard media already looks neat and systematic starting from preparation, doing baseline 1 (A1) to find out the child's initial abilities, interventions carried out in early learning activities, implementation of core activities, child conditioning and the process of closing lessons, to baseline 2 (A2).

Understanding of two-dimentional figure of children with vision barriers in the inclusion class of SLB Aisyiyah Singaparna appeared to experience significant development ranging from baseline 1(A1), intervention, to baseline A2 shown by a graph of understanding two-dimentional figure children with vision barriers that experienced an increase in each session.

Improved understanding of two-dimentional figure children with visible resistance by using geoboard media is expressed to have a positive influence. The results of this study showed

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that geoboard media can improve the understanding of children with vision barriers to SLB inclusion class Aisyiyah Singaparna which is intended with the results of data analysis in conditions and between conditions.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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