DEVELOPMENT OF INTERACTIVE LEARNING MEDIA BY PROSPECTIVE MATHEMATICS TEACHERS FOR DYSCALCULiA STUDENTS BASED ON THE STIFIN CONCEPT IN MONTESSORI LEARNING

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ABSTRACT
As prospective mathematics teachers, it is certainly very important for them to be able to handle classes with all the diversity of students. In this study, researchers confronted students who took the interactive learning media course to be able to create learning media that can be used by dyscalculia survivors based on the STIFIn concept in Montessori learning. The results of the study showed that students were able to create learning media for Sensing type dyscalculia students by presenting images, patterns, videos to clarify concepts, and presenting many practice questions. For Thinking dyscalculia students, students presented learning media that applied logic in solving problems. For Intuiting type dyscalculia students, students presented learning media in the form of visualizations using diagrams, graphs, or images to clarify concepts and find patterns and relationships between concepts. Learning media for Feeling type dyscalculia students is by presenting real examples that build personal closeness with students. While for instinct type dyscalculia students, the learning media provides them with the opportunity to discuss topics openly and spontaneously.

Keywords: STIFIn, dyscalculia, montessori, mathematics

INTRODUCTION

STIFIn is a concept used to determine the intelligence engine and dominant brain layer possessed by students (Rafianti & Pujiastuti, 2017) (Panggabean, Silaban, & Simorangkir, 2019). The five intelligence engines in STIFIn are Sensing if the lower left brain is dominant, Thinking if the upper left brain is dominant, Intuiting if the upper right brain is dominant, Feeling is dominant in the lower right brain, and Instinct is dominant in the middle brain (Kamid, Dewi, Kurniawan, Azzahra, & Nawahdani, 2023). Based on the STIFIn concept, by knowing the dominant and frequently used brain hemisphere, it can also determine the most effective learning style of students. STIFIn compiles theories from the fields of psychology, neuroscience, and human resource science (Mundiri & Zahra, 2017).

So far, STIFIn has only been applied to typical students. There is absolutely no research on STIFIn strategies for marginal students, especially dyscalculia students. In fact, 3 - 7% of all children, adolescents, and adults suffer from dyscalculia (Haberstroh & Korne, 2019). Dyscalculia is a specific learning difficulty in the form of an inability to count which is caused by a disorder of the central nervous system (Kunwar & Sharma,

2020). Students who experience dyscalculia will find it difficult to understand and learn basic mathematical concepts, be it memorizing numbers (dates, telephone numbers, or house numbers), counting, grouping numbers, and understanding the numbering system (Salisa & Meliasari, 2023).

In previous studies, dyscalculia students experienced increased learning outcomes in the operation of subtracting a series downward using number glasses (Yovelia & Efendi, 2019), dyscalculia students experienced increased ability to recognize flat shapes through the game of hopscotch (Malay & Armaini, 2020), dyscalculia students experienced increased ability to identify number symbols 1 to 10 using number basket media (Safitri & Iswari, 2024). All research conducted always utilizes the environment of real objects that are around.

Based on research on dyscalculia which is adjusted to previous research conducted by researchers, the learning method used in this study is Montessori. This method emphasizes the importance of adjusting the child's learning environment to their level of development, and the role of physical activity in absorbing academic concepts and practical skills (Cipta, Kartika, & Kurniawati, 2020). Montessori was promoted by Maria Montessori, a doctor who finally devoted herself to creating a learning house for children with mental disorders. The Montessori concept in learning activities is different from other concepts. In Montessori, students are the ones who dominate the classroom stage with the environment as the center of their learning activities (Cipta, Avianty, & Kurniawati, 2019).

Montessori emphasizes learning that prioritizes freedom, freedom in choosing activities and freedom to play so that children's growth and development are at their own pace and speed (Cipta, Avianty, & Kurniawati, 2019). In Montessori, children learn abstract concepts through environments and learning media that are designed according to the child's age and development (Agustin, 2020). Thus, mathematical concepts are not difficult for children, but rather more fun and easier to understand (Cipta, Kartika, & Kuriawati, 2022).

As prospective mathematics teachers, it is certainly very necessary for them to be able to deal with classes with all the diversity of students. In this study, researchers confronted students who took interactive learning media courses to be able to create learning media that can be used by dyscalculia survivors based on the STIFIn concept in Montessori learning.

METHOD

The research method used is descriptive qualitative because it produces verbal data in the form of sentences. The verbal data that has been obtained will be processed and analyzed to produce the right conclusions. This study will examine the learning media created by prospective mathematics teachers so that the media fulfills its function so that it can be used by dyscalculia students in Montessori learning. The learning media created by these students will vary according to the STIFIn

concept, namely by supporting the intelligence machine sensing, thinking, intuiting, feeling, and instinct.

Based on these objectives, it is relevant if this research is carried out using a qualitative approach. The researcher acts as the main instrument in the research so that the researcher must be in the field to record and record everything that happens during the data collection process. The research was conducted at Insan Budi Utomo University in the Interactive Learning Media Class in the Mathematics Education Study Program, Odd Semester, 2024/2025 Academic Year.

The data in the study are in the form of interactive learning media that have been created by students by applying the STIFIn concept indicators, Montessori learning, and dyscalculia. After the data collection process is carried out, the steps taken in data analysis in this study are as follows. (1) Data reduction stage. In this data reduction activity, selection, simplification, focusing, and transformation of the data that has been obtained are carried out. The data collected are in the form of STIFIn test results, interview results and observation results which will then be reduced so that researchers can draw conclusions. (2) Data presentation stage. Researchers present information in a coherent and clear manner so that it can be used to draw a conclusion. The data presentation that will be carried out is in the form of narrative text so that it can help researchers to draw a conclusion. (3) Data conclusion stage. After the data is collected, it is continued with the assumptions that arise and then verification of these assumptions is carried out so that new information is obtained and finally conclusions can be drawn based on the data obtained.

RESULTS AND DISCUSSION

The interactive learning media course is a compulsory course in the Mathematics Education Study Program at Insan Budi Utomo University. One of the outputs of this course is the creation of interactive learning media made by students. In this study, students will develop interactive learning media for dyscalculia students based on the STIFIn concept in Montessori learning.

Before compiling the learning media, students have been introduced to the concept of STIFIn, Montessori learning, and the existence of dyscalculia students. The class is then divided into ten groups with the provision that two groups each create interactive learning media for Sensing, Thinking, Intuiting, Feeling, and Instinct students.

The characteristics of Sensing students are that they prefer details and facts, rely on direct experience, have good observation skills, and prefer to learn directly. By considering these characteristics, that Sensing students have intelligence in sensing, then some indicators that need to be considered so that learning media can be accepted by Sensing students are (1) using real examples to clarify concepts, (2) using images, videos, or animations to clarify concepts, (3) always repeating and practicing what has been learned by making lots of practice questions, (4) asking students to make notes and lists to organize information. An excerpt of Montessori

learning media for Sensing type dyscalculia students that was successfully created by students is as shown in Figure 1.

Figure 1. Learning Media Using Videos to Clarify Concepts

The characteristics of Thinking students are analytical and logical, like to understand concepts and principles, value truth and accuracy, like to evaluate information, and have critical and creative abilities. Thus, several indicators that need to be considered in creating learning media for Thinking students, students who always think critically are (1) studying concepts in depth and looking for patterns and relationships between concepts, (2) giving students the opportunity to criticize sources of information, (3) applying logic in solving problems, and (4) holding discussions on the topic. An excerpt of Montessori learning media for Thinking type dyscalculia students that was successfully created by students is as shown in Figure 2.

Figure 2. Learning Media Provides Problems Solved with Logic

The characteristics of Intuiting students are having the ability to recognize patterns and relationships, liking to understand concepts as a whole, appreciating originality and creativity, liking to think abstractly,

having good visualization skills. By considering these characteristics, several indicators that need to be considered so that learning media can be accepted by Intuiting students are (1) creating visualizations using diagrams, graphs, or pictures to clarify concepts and find patterns and relationships between concepts, (2) providing opportunities for students to develop theories or hypotheses, (3) using analogies to clarify concepts, (4) providing opportunities for students to develop creativity by doing creative activities such as writing, drawing, or thinking abstractly. An excerpt of Montessori learning media for Thinking type dyscalculia students that was successfully created by students is as shown in Figure 3.

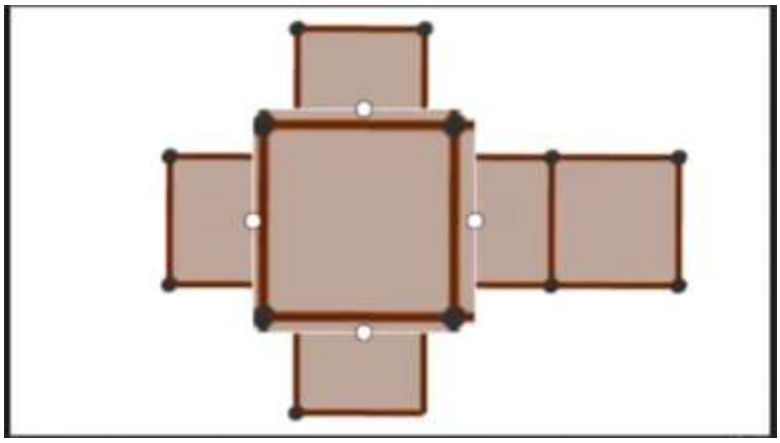

Figure 3. Learning Media in the Form of Image Visualization to Clarify Concepts and Find Patterns and Relationships Between Concepts

The characteristics of Feeling students are having high empathy, liking to help others, valuing interpersonal relationships, being sensitive to other people's feelings, and having good communication skills. By considering these characteristics, that Feeling students have the ability to internalize, then several indicators that need to be considered so that learning media can be accepted by Feeling students are (1) providing opportunities to learn with friends to deepen understanding, (2) using real examples to clarify concepts, (3) developing communication skills by practicing speaking and writing, (4) providing students with opportunities to reflect on experiences and feelings. An excerpt of Montessori learning media for Thinking type dyscalculia students that was successfully created by students is as shown in Figure 4.

Figure 4. Learning Media Using Real Examples to Clarify Concepts

The characteristics of Instinctive students are having the ability to recognize patterns and relationships, liking to understand concepts intuitively, appreciating authenticity and spontaneity, liking to think flexibly, and having good adaptability. Thus, several indicators that need to be considered in creating learning media so that they can be accepted by Instinctive students are (1) using real examples to clarify concepts, (2) giving students the opportunity to discuss topics openly and spontaneously, (3) conducting learning through real projects, (4) giving students the opportunity to reflect on experiences and feelings. An excerpt of Montessori learning media for Thinking type dyscalculia students that was successfully created by students is as shown in Figure 5.

Figure 5. Learning Media Gives Students the Opportunity to Discuss Topics Openly and Spontaneously

The learning media has also been adjusted to the characteristics of Montessori learning, namely making students master the classroom stage with the environment as the center of their learning activities, students learn abstract concepts through the environment and learning media that

are designed according to the age and development of the child, making mathematical concepts not difficult for children, but rather more fun and easier to understand.

CONCLUSION

In the development of learning media carried out by students, there are several things that need to be considered, including the assistance of researchers in its preparation so that the media is in accordance with the characteristics of dyscalculia students, the STIFIn intelligence engine, and the characteristics of Montessori learning. Several times, in the development of this learning media, a conceptual error was found in STIFIn, such as providing too many practice questions for Thinking students, even though they do not need it. On the contrary, Sensing students who need a lot of practice questions are given a discussion space that is needed by Thinking students. Students also need to be re-emphasized that for Feeling children, a personal approach such as social emotional learning is very much needed. Then it is also necessary to provide space for Intuiting students to be able to develop their creative ideas.

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