

The Use of Visual Media to Improve Students' Conceptual Understanding of Line Diagram Material at MI NU

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Abstract

This study aims to describe the extent of students' ability to read and present data in the form of line diagrams in the form of visual media. This study uses a descriptive qualitative approach with data collection techniques through participatory observation, interviews, and document reviews involving teachers and students. Data analysis was carried out in three main stages: simplifying the data, presenting the data systematically, and drawing conclusions from the compiled data. This study revealed that the use of visual media such as images not only makes it easier for students to grasp the meaning of the text, but also deepens their overall understanding in interpreting and creating line diagrams. Students become more active and motivated during learning, and teachers realize that the use of visual media can help students understand abstract concepts by transforming them into more concrete and easier to understand concepts. The results of this study indicate that the use of visual media in the learning process can be an effective approach and have a positive influence on improving the ability to read and present data, especially in the material of line diagrams.

INTRODUCTION

Education is a social process that occurs systematically and planned with the goal of shaping individuals in a more positive direction. Teachers have the primary responsibility for improving the quality of education, thus they also play a role in encouraging students' interest in learning and improving their learning outcomes, which in turn contributes to improving the quality of human resources (Maulansyah et al., 2023). During learning activities, students are guided to optimize their potential through teacher guidance, creating learning experiences that address cognitive, affective, and psychomotor aspects, thereby fostering student initiative. Therefore, learning activities in schools serve as a means of transferring knowledge toward maturity, with teachers as the primary facilitators (Ardianto, 2016).

The teacher acts as a facilitator who does not dominate the learning process by telling stories, lecturing, or providing long explanations, but rather views students as individuals who are capable and responsible for their own learning and are able to use

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learning resources optimally so that their learning process takes place according to the correct instructions (Rahmawati & Suryadi, 2019). At the elementary education level, teachers act as companions and facilitators and can use media in conducting learning, so that it is more interesting and students do not get bored easily (Sahara et al., 2023). There are various types of media, such as visuals, audiovisuals, and images, which can make it easier for teachers to convey and explain material more efficiently and clearly. By using media, students can deepen their understanding during the learning process. In mathematics learning, students often experience difficulty understanding the material if teachers do not utilize learning media, resulting in less than optimal understanding of the lesson.

The learning process will take place optimally if students show a strong interest in learning. Some indicators that reflect an increase in students' conceptual understanding include: 1) being able to convey a concept that has been learned in their own way and style of language, 2) classifying objects based on characteristics that correspond to the concept being learned, 3) providing explanations by including appropriate and inappropriate examples related to a concept, 4) expressing a concept using various representation methods in mathematics, 5) designing the necessary or sufficient provisions in relation to a concept, 6) determining and using certain procedures or steps appropriately, and 7) applying systematic principles or steps in solving a problem (Sari, 2017). Teaching methods are a key factor influencing improved learning outcomes. Therefore, to maximize student learning, teaching methods need to be designed to be as effective and engaging as possible. Understanding is further defined as the ability to grasp a concept and assign meaning to the material being studied.

The ability to understand data concepts in the form of line diagrams is one of the basic skills in elementary school mathematics (Aledya, 2019). Line diagrams, which combine numerical understanding with visual representation, often pose a challenge for students, especially fourth graders. Many students have difficulty interpreting data, identifying relationships between data, and presenting it accurately.

In the elementary school curriculum, the competency to understand the concept of line diagram data not only requires the ability to count, but also relies on visual reasoning and simple logic. (Setiawan, 2021). Unfortunately, in classroom learning, this material is often delivered conventionally through lectures and practice exercises without the support

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of engaging and contextual media. This can quickly lead to student boredom, difficulty understanding the material, and a lack of optimal engagement in learning activities.

This study aims to explore in more depth the use of visual media in learning activities aimed at deepening students' understanding of the concept of data in the presentation of line diagrams in fourth grade students. Through a qualitative approach, this study also seeks to describe students' responses to the media used and how teachers integrate visual media in daily learning activities (Lestari et al., 2024)

Through a more comprehensive understanding of the use and impact of visual media, this research is expected to make a tangible contribution to increasing innovation in mathematics learning strategies, focusing on the needs and active participation of students.

In accordance with the previous journal conducted by Septy et al., Muhammadiyah University of Tangerang in their research entitled "Application of Visual Media for Fifth Grade Students at SDN Muncul 1" stated that visual media plays a significant role in supporting the effectiveness of learning activities at the elementary school level (Nurfadhillah et al., 2021).

Research conducted by Reza Syehma Bahtiar from the PGSD Study Program, FIP, Surabaya State University, entitled "The Use of Visual Media to Improve Learning Outcomes on Environmental Themes for Second Grade Elementary School Students" explains that the use of visual media has a positive impact on improving student learning achievement. Research data indicates that teacher activity has increased from cycle I to cycle II, namely from 76.65% to 92.19%. Likewise, student activity has also increased, from 76.79% in cycle I to 91.07% in cycle II. In addition, there is also an increase in student learning outcomes, namely from 70% in cycle I to 93.33% in cycle II. Thus, it can be concluded that the use of visual media has been proven to be able to improve student learning outcomes in environmental theme learning in second grade elementary school (Bahtiar, 2013).

Research conducted by Pramitha Sari from the Mathematics Education Study Program of STKIP Muhammadiyah Pagaralam in 2017 with the title "Students' Understanding of Mathematical Concepts on the Material of Angle Sizes Through the PMRI Approach" The results of the study proved that the use of the PMRI approach was able to improve the understanding of sixth grade elementary school students on mathematical concepts, especially in the material of angle sizes with an average achievement of 72% (good category). Students were most prominent in classifying problem

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solving (88.5%) and using procedures (85%), but were still weak in presenting concepts in various forms (49.5%). The PMRI approach helps students understand concepts through real contexts and meaningful activities. (Sari, 2017).

The results of observations conducted by researchers in class IV MI NU showed that the majority of students experienced difficulties in understanding basic concepts related to diagram material, especially in interpreting data from line diagrams, as well as in converting data from tabular form to diagram form. This difficulty was seen when students were asked to explain the meaning of data and draw conclusions from visual displays. In addition, the low ability of visual representation was also caused by the lack of use of interactive and contextual visual media in the learning process. The use of visual media provides great benefits to support students' understanding of a concept in a deeper and more profound and meaningful and interesting relationship between data representations.

So, by looking at the problems above, this researcher emphasizes that the use of visual media is very important and can improve understanding of the material given by the teacher.

METHOD

This research was conducted at the Nahdatul Ulama Islamic Elementary School in North Metro, Metro City. It focused on fourth-grade students and employed a qualitative field research approach (Elitear & Koto, 2016), a type of research that emphasizes the analysis of scientific thought processes and logic, and focuses its findings on real-world situations at the research site, focusing on the implementation of learning with the aid of visual media. The purpose of this research is to describe how students understand the material on line diagrams and to outline the various efforts made to overcome challenges that arise during the process by students in understanding the material (Fadillah & Munandar, 2021).

This study involved all 20 fourth-grade students as subjects. Data collection techniques used included observation, interviews, and documentation studies (Alhamid, 2019). The collected data was analyzed using a descriptive narrative approach, presenting the data in the form of systematic descriptions or stories that illustrate the situation in the field.

The data was analyzed based on the results of interviews, observations, and documentation that had been collected in a structured manner to obtain a deep

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understanding of the use of visual media in the mathematics learning process in grade IV, however, in this study, an in-depth analysis regarding the validity of the instruments used had not been carried out, and data analysis was more focused on descriptive presentation of the data obtained during the research.

FINDINGS AND DISCUSSION

The implication of these findings is that visual media can serve as a powerful tool for deepening students' understanding in learning line diagrams. The strategic use of images, from the apperception phase to conceptual reinforcement, has been shown to create a more lively and enjoyable learning environment. Therefore, educators are encouraged to integrate more appropriate types of images into the curriculum or train students in visual interpretation skills.

The Use of Visual Media to Improve Students' Conceptual Understanding

The use of visual media has proven to be an effective approach in helping students better understand various subjects (Nahri, 2024). The human brain naturally processes visual information faster than pure text, making images a powerful bridge to understanding abstract or complex concepts.

1. Steps for the use of visual media in class:
 - a. The teacher begins by eliciting students' understanding by asking opening questions or riddles related to the picture.
 - b. Then, ask leading questions to encourage students to observe details. Direct students' attention to focus on specific details in the picture. Use pointers for specific parts, and ask, "Notice this part, what can you tell me about it?"
 - c. Next, relate what students see to the subject matter or concepts that will be taught.
 - d. Furthermore, to add variety, educators can implement several activities. Teachers can encourage students to guess the picture from the small parts shown. Teachers can also ask students to redraw or add details to the picture.
 - e. and After students have explored, the teacher provides additional information about the images and their correlation with the lesson material.
 - f. Finally, the teacher encourages students to review and understand what they have learned from the picture with questions related to the material.

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Gambar 1. Dokumentasi Kegiatan di Kelas

The use of visual media in the learning process of line diagram material is implemented through several structured stages (Setiyawan, 2020). At the beginning of the session, an illustration is displayed to spark students' understanding and relate the material to their real-life experiences. Observations show that students respond enthusiastically, characterized by asking questions, expressing surprise, and discussing with friends. Then, discussion facilitation takes place by asking students to identify the main objects in the image and express their initial interpretations. Data from the participant observation sheet shows that students actively participate in this session, showing superior results compared to the conventional lecture approach. Concept explanations point to specific parts of the image, which visually represent.

Further analysis indicates that the use of visual media such as images plays a significant role in helping students better understand the line diagram material (Latifaturrodhita et al., 2024). The results showed an increase in average scores based on a comparison of pre-test and post-test results after the intervention with images. This indicates that visual representations facilitate more efficient information processing compared to verbal explanations alone. The use of illustrations as discussion starters can contribute to developing students' critical thinking skills, as reflected in their ability to identify and analyze cause-and-effect relationships or draw inferences from image details. Student engagement levels during learning also increased, with students demonstrating better focus and interaction.

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These findings are consistent with cognitive learning theory, which states that images help organize information and form stronger mental schemas in long-term memory (Ekawati, 2019). However, it should be noted that there was some initial confusion regarding the interpretation of the images, which required further clarification from the teacher.

Students' Conceptual Understanding of Data Diagrams

Students' ability to understand the concept of diagram data encompasses their skills in reading, interpreting, and evaluating information presented through visual presentations, such as bar charts, pie charts, line charts, or pictures. Through this understanding, students are expected to be able to identify important information from diagrams, compare data, and draw logical conclusions based on the available data. Furthermore, students also need to understand how to create diagrams from raw data, so that they are not only readers but also able to present information visually. However, during the learning process, many students encounter obstacles, including understanding the concept of scale, selecting the appropriate type of diagram, or summarizing information accurately.

Understanding the concept of data has several indicators, including:

1. Students' ability to understand diagram data includes their skills in reading, interpreting, and evaluating information presented using their own words, without simply memorizing formal definitions from textbooks.
2. Grouping or classifying objects based on certain characteristics, namely students' ability to group objects according to their characteristics or characteristics that are appropriate to the mathematical material being studied.
3. Explaining a concept by presenting correct and incorrect examples, this can measure students' ability to identify and differentiate objects or situations that correctly represent a particular mathematical concept, with objects or situations that do not correspond to or contradict the concept.
4. Conveying concepts through various forms of mathematical representation, namely the ability of students to express or show a mathematical concept using various methods or media, such as mathematical symbols, pictures, graphs, tables, or verbal language.
5. Identifying the conditions required or starting from a concept, namely the student's ability to determine the conditions that need to be met so that a concept can be considered fully valid.

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6. Students' abilities are reflected in how they determine, apply, and maximize actions by using, utilizing, and selecting the most efficient and appropriate procedures, operations, or methods in solving mathematical problems based on the concepts they have learned.
7. Using students' ability to create line diagrams to apply concepts or problem-solving steps systematically and in accordance with the correct steps (Sari, 2017).

Analysis of the improvement in conceptual understanding of line charts shows that students experienced significant improvements in their ability to interpret visual information (Ningrum et al., 2024). This improvement can be attributed to several factors. First, systematic training in identifying the basic components of a line chart (X-axis, Y-axis, title, labels, legend) helped students build a strong foundation of understanding. Second, focusing on trend analysis (rising, falling, stable, fluctuating) enabled students to not only see data points but also understand the dynamics of data change over time or between categories. This aligns with the principles of visual information processing theory, which states that the human brain is more efficient at recognizing patterns and relationships when information is presented visually and structured.

Qualitative observations also support these findings. During group discussions, students demonstrated improved ability to identify peaks and valleys, periods of fastest growth, and correlations between two or more lines on a chart

Skills in Presenting Data in Line Diagram Form

In addition to conceptual understanding, the study also observed significant improvements in students' ability to process and present their own data in line charts (Indriani & Noordiana, 2022). Before the intervention, many students struggled to select the appropriate graph type or created disproportionate and unclearly labeled diagrams. After a series of practical exercises, students demonstrated marked improvement.

This improvement in skills is primarily due to the emphasis on accuracy and clarity in the presentation of line diagrams. Students are trained to:

1. Choose the right scale for the X and Y axes so that the data can be seen clearly and proportionally, avoiding visual distortion.
2. Providing informative and descriptive axis labels and chart titles allows readers to understand the context of the data without the need for additional explanation.
3. Use a clear legend if there is more than one line, to effectively differentiate data categories.

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4. Accurately connect data points to depict true trends

Students' ability to independently transform raw data from tables into a correct and informative line chart format demonstrates a deep conceptual understanding of the function and purpose of data visualization. This aligns with constructivism theory, which argues that learning is more optimal when students are actively engaged in constructing their own understanding and knowledge through practice. This skill is not only relevant to mathematics but also serves as an important foundation for cross-disciplinary data literacy, preparing students to effectively communicate the results of scientific investigations or social statistics.

CONCLUSION

Based on the results and discussion of research on the use of visual media in improving students' understanding of the material of line diagrams in the form of images in class IV of Nahdatul Ulama Elementary School, North Metro, Metro City, several things can be concluded. First, visual media-based learning implemented through the stages of presenting diagram images can significantly improve students' understanding. Students not only understand the concept of data in line diagrams, but are also able to relate the data in the form of logical and enjoyable narratives. Second, this approach combines cognitive, affective, and social aspects that play an important role in mathematics learning to help form a deeper understanding of concepts that are more comprehensive and easy to apply in real life. Thus, visual media-based learning is proven to be effective as a learning strategy for bar diagram material at the elementary school level.

Based on the conclusions and limitations of this study, teachers are advised to provide appropriate learning with appropriate methods for each lesson material delivered designed to be able to strengthen students' understanding in the learning process. This study is expected to be able to present an overview, provide information, and be a consideration for further researchers who are interested in studying similar topics in the future, especially regarding the use of learning approaches that utilize visual media to increase students' understanding more deeply towards mathematics lesson materials.

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