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ANALYSIS OF STUDENTS' DIFFICULTIES IN LEARNING MATHEMATICS OF CIRCLE GEOMETRY IN FOURTH GRADE ELEMENTARY SCHOOL

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Abstract

The present study endeavors to comprehensively examine the obstacles faced by elementary school students when attempting to grasp fundamental mathematical concepts pertaining to circles. Specifically focusing on Grade 4 students at SDN Cipondoh 2, Tangerang City. The primary objective is to shed light on the difficulties encountered by students in three core areas: calculating circle area and circumference, understanding the complex concept of π (pi), and accurately sketching circles utilizing a compass. Various tools are employed to scrutinize the obstacles students encounter, including tasks such as calculating circle area and circumference, comprehending the intricate π (pi) concept, and accurately sketching circles using a compass. The findings indicate that students encounter hurdles in computing circle area and circumference due to the need to understand underlying formulas and calculation procedures. Additionally, comprehending the π (pi) concept presents a notable challenge in circle calculations. Moreover, students struggle with precise and symmetrical circle drawing using a compass. The research outcomes provide valuable insights for formulating effective pedagogical strategies to help students overcome challenges in comprehending and applying circle geometry principles.

Keywords: *Analysis, Creative Thinking Ability, Mathematics*

1. INTRODUCTION

Mathematics of flat shapes is one of the subjects that studies the forms and properties of flat surfaces, such as triangles, squares, circles, and so on. The teaching of flat shape mathematics is an integral part of the mathematics curriculum at various levels of education, from elementary school to secondary school. The material taught in flat shape mathematics is crucial as it helps students understand concepts of geometry, measurement, and the relationships between flat shapes (Putri & Dewi, 2020). One of the main focuses in the study of flat shape mathematics is the circle. Circles have unique properties and widespread applications in everyday life and various other fields.

Learning about circular flat shapes involves grasping basic concepts such as radius, diameter, circumference, and area of the circle (Nurhasanah et al., 2018). Students will also learn about the relationships between circles and other elements like arcs, chord, central angles, and sectors. They will study formulas related to circles and how to use them to calculate area, circumference, and volume.

A strong understanding of circular flat shape mathematics provides a solid foundation for students to comprehend more complex mathematical concepts and their real-life applications. Circles are a geometric shape with numerous applications in everyday life. Circular flat shapes have unique properties that influence calculations and

their applications in various mathematical and non-mathematical contexts (Putri & Dewi, 2020). Therefore, a solid understanding of the concept and properties of circles is essential for students. Teaching circular flat shape mathematics usually begins with a basic understanding of terms related to circles, such as radius, diameter, circumference, and area. Students also learn about the relationships between these elements and how to calculate related values. Additionally, students are introduced to the concept of pi (π), an infinite number that is related to circle calculations.

A strong understanding of circular flat shapes has broad implications in various fields, such as physics, engineering, advanced mathematics, and technological applications. For instance, understanding circles is necessary for calculating the surface area of a sphere, designing curved bridges, calculating planetary orbits, and much more. However, students often face difficulties in comprehending and applying the concepts of circular flat shape mathematics. They might struggle with calculating the circumference and area of circles, recognizing the relationships between circle elements, or even visualizing circle shapes accurately. Therefore, it is important for educators to understand these difficulties and develop effective teaching strategies to help students overcome obstacles in understanding and applying circular flat shape concepts.

The issue of difficulties faced by students in learning circular flat shape mathematics in schools is a significant concern in the field of education (Manalu et al., 2020). For some students, the concept of circles can be challenging and complex due to their unconventional shape compared to other flat shapes, such as triangles or squares. Some students may struggle to understand the properties of circles, the related formulas, and their calculations. Students' difficulties in understanding circular flat shapes can be caused by various factors. Firstly, the concept of circles is often considered abstract, making it difficult for students to visualize and relate to real-world situations. Secondly, the presented teaching materials may not be particularly engaging or well-explained, resulting in a lack of motivation for students to learn further.

A packed curriculum can also be a factor that affects learning, as mathematics instruction must accommodate limited time. This leads to a lack of time to explain concepts in detail and provide students with ample practice opportunities. Additionally, limitations in resources, such as limited mathematical tools or lack of support from the school, parents, and classmates, can hinder the creation of an effective learning environment.

Improving students' understanding of circular flat shape concepts is a crucial step in strengthening their mathematical foundation and preparing them to tackle more complex challenges in the field of geometry and its applications. Therefore, this research aims to delve into and analyze the difficulties faced by students in learning circular flat shape mathematics. By understanding and addressing the obstacles students encounter in their learning, educators can significantly contribute to the development of students' mathematical potential and help them achieve better outcomes in the future.

2. RESEARCH METHODS

This research employs a descriptive data research method to gain a comprehensive insight into the challenges encountered by students in learning mathematics, specifically focusing on the topic of circle geometry, in the fourth-grade class of SDN Cipondoh 2. Data is collected through interactions with the primary informant, Sandra Tavipa, S. Pd.,

who has 12 years of teaching experience at the school. Data collection involves interviews and discussions with the informant, encompassing both written and oral responses.

Furthermore, the study is conducted within the environment of SDN Cipondoh 2, with the data collection period taking place on July 10, 2023. The gathered data will be meticulously analyzed to identify the difficulties and obstacles faced by students in comprehending the concept of circle geometry, as well as to analyze potential factors influencing these difficulties. As such, this research method aims to provide a more comprehensive understanding of the challenges students encounter in learning mathematics in the fourth-grade class of SDN Cipondoh 2.

3. RESULTS AND DISCUSSION

As outlined in the Minister of National Education Regulation Number 41 of 2007, the concept of basic competencies entails a collection of essential skills and abilities that students are expected to acquire within specific subject areas. These competencies serve as fundamental building blocks for their educational development. Indicators, on the other hand, are quantifiable and observable behaviors that serve as markers of the successful attainment of these basic competencies. These indicators play a pivotal role in the assessment and evaluation process of students' subject mastery (ANDIKARLINA, 2015).

Moving to the realm of geometry, a circle emerges as a two-dimensional geometric figure formed by a set of points uniformly distanced from a central point (Warmi, 2019). The distance from this central point to any point on the circle's perimeter is termed as its radius (r). This geometric entity holds unique properties and implications in various mathematical contexts.

However, when delving into the realm of teaching and learning, it becomes evident that students often grapple with specific challenges while comprehending and applying the concept of circles. Analysis has shown that certain difficulties are commonly encountered. Among these are struggles in grasping the foundational principles underlying circles. For instance, students frequently encounter obstacles when attempting to understand fundamental concepts like radius, diameter, the geometry of the circle itself, and the interplay of these elements within the broader context of circle geometry.

In essence, this research aims to explore and shed light on these challenges within the framework of circle geometry education. By examining the difficulties that students encounter, particularly in comprehending core concepts, this study seeks to provide valuable insights into potential areas for pedagogical improvement. By addressing these obstacles and developing effective teaching strategies, educators can enhance students' understanding and application of circle geometry, thus contributing to their overall mathematical proficiency. The following are some answers from students' math exercises:

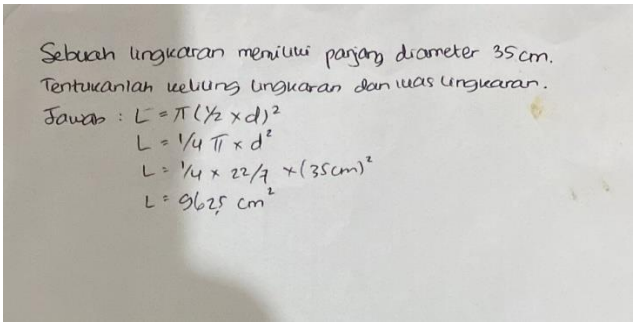

Figure 1. Student Answers

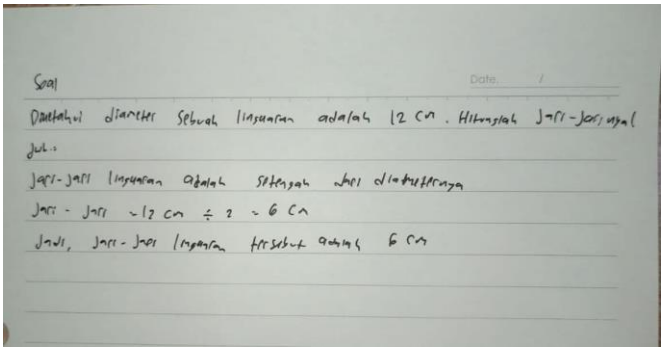

Figure 2. Student Answers

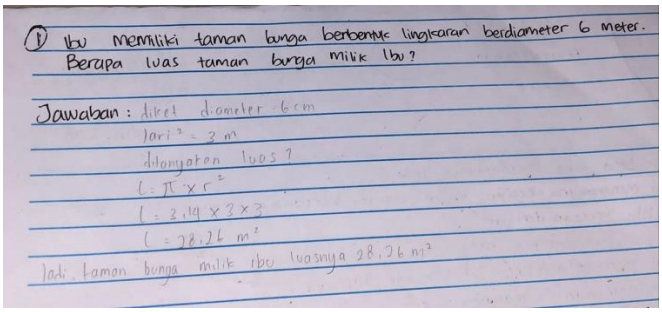

Figure 3. Student Answers

Based on the answers of some students above, it can be seen that in learning mathematics, particularly when delving into the intricacies of circle concepts, students often encounter a series of challenges. One prominent aspect is the computation of the area and circumference of circles. Students frequently grapple with comprehending the relevant formulas and the step-by-step procedures necessary for these calculations. The concept of π (pi) also emerges as a critical point of difficulty, with students struggling to grasp and apply this infinite number in various calculation contexts.

However, the hurdles are not confined solely to calculations and drawing abilities; measurement also presents obstacles. Research indicates that accurately measuring circles using standard measuring tools such as rulers is a complex task. The circular shape lacks straight sides that can be easily measured, leading students to often struggle in precisely measuring the diameter or radius of circles.

In the context of circle coordinates, complexity further arises. Students face challenges in calculating the circumference and area of circles, as these processes involve applying more intricate formulas compared to other plane figures. This challenge may be

even more pronounced for fourth-grade students who might not yet have a full grasp of these formulas, thereby requiring further assistance in calculating both the circumference and area of circles.

Through this research, we gain profound insights into the difficulties students face in comprehending and applying circle concepts. Understanding these sources of difficulty paves the way for the development of more effective teaching strategies, allowing educators to aid students in overcoming these challenges and deepening their understanding of circle geometry. Consequently, it is expected that students' grasp of this material will become more solid and robust, equipping them with a stronger foundation to tackle more complex mathematical challenges in the future.

4. CONCLUSION

In conclusion, based on the results of interviews, analysis, and discussions conducted, it is evident that a significant number of students continue to encounter challenges in comprehending the concept of circle geometry. In response to these findings, the study offers practical solutions. If difficulties persist in understanding circle geometry, students are encouraged to seek assistance without hesitation, whether from teachers, tutors, or classmates. Engaging in discussions and receiving explanations can provide fresh perspectives and the necessary support.

With patience, consistent practice, and appropriate guidance, the hurdles in comprehending and applying the principles of circle geometry can be overcome. Emphasizing the cultivation of a strong understanding of circles is paramount, given the widespread applications of this concept in mathematics and various other fields. As students embark on this journey of persistent effort and seek help when needed, they can enhance their grasp of circle geometry, thereby elevating their overall mathematical proficiency.

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