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Analysis of Junior High School Students' Mathematical Disposition Through Congklak Games in Working on Story Problems

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ABSTRACT

This study is important because of the many challenges faced by students in understanding word problems, especially those related to the concepts of LCM and GCF. Therefore, this study intends to examine students' mathematical disposition in solving word problems related to the concepts of Least Common Multiple (LCM) and Greatest Common Divisor (GCF). The research method used was a qualitative one, analyzing subjects in junior high school. This study was conducted in grade VII of junior high school MHI Bangsalsari. The instruments used include observation, problem study (questions), interviews, and documentation. We analyze the data using qualitative descriptions to solve word problems, utilizing Congklak as an educational tool. The research findings show that the congklak game serves as an excellent medium to increase students' interest in mathematics during the learning process. The implications of this research can help teachers in explaining topics by providing learning media that facilitate student understanding.

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1. INTRODUCTION

Disposition analysis refers to the process of evaluating and observing a person's behavior, attitudes, or actions in a given situation (Fadillah et al., 2020; Janse van Rensburg & Rauscher, 2022). In this context, "disposition" refers to intrinsic characteristics that influence how an individual behaves or reacts to their environment or peers. Disposition is frequently used in various fields, including psychology, education, and management (Biag & Sherer, 2021). For example, in psychology, it can be demonstrated by how a person's disposition (such as optimism or pessimism) influences how they cope with stress and anxiety. Education can use disposition analysis to understand how students engage with the subject matter or the learning environment (Toker & Baturay, 2022). In general, the goal of disposition analysis is to understand and evaluate an individual's behavior or response based on their intrinsic characteristics, as each student has different abilities and character traits in solving problems.

Mathematics is a compulsory subject taught from elementary to secondary education in Indonesia. Sari and Sutirna (2021) argue that mathematics, as a fundamental science, is highly beneficial and relevant to human existence. This aligns with Vos's (2018) statement that the goal of mathematics education in schools is to equip students to use mathematical concepts and reasoning in everyday life. Therefore, students must learn and understand mathematics well. Furthermore, to understand mathematics well, students must have self-awareness and motivation to learn it (Demetriou et al., 2020). Desire, motivation, and engagement in learning are crucial for educational success (Acosta-Gonzaga & Ramirez-Arellano, 2022).

Inadequate mathematical understanding is caused by various issues (Schoenfeld, 2013). A significant problem in mathematics education is the prevailing perception among students that the subject is challenging and uninteresting. This perception leads many students to develop an aversion to mathematics and consider it a subject to be avoided. Students with an aversion to mathematics may face challenges in understanding the topic, leading to decreased mathematics achievement (DiStefano et al., 2023). This aligns with the statement Schaeffer et al. (2021) that students with high levels of anxiety do not perform as effectively as children with low levels of anxiety. Students who experience challenges in mathematics share many characteristics (Jackson et al., 2017; Olivares et al., 2020). Students with learning difficulties frequently make errors in arithmetic (Micallef & Prior, 2004), geometry (Kingsdorf & Krawec, 2014), and verbal problem solving (Zhang et al., 2021).

Pérez (2018) emphasized that in mathematics education, students are expected to acquire cognitive information while developing a critical and meticulous disposition, maintain objectivity and openness, appreciate the aesthetic aspects of mathematics, cultivate curiosity, engage in creative thinking and action, and enjoy the learning process. These attitudes and cognitive patterns will essentially foster a mathematical disposition (Leader & Middleton, 2004; Pérez, 2018; Rauscher & Badenhorst, 2021), which is characterized by a strong desire, awareness, and commitment among students to engage with mathematics and undertake various mathematical endeavors.

Myers et al. (2022) emphasized that in solving math story problems, students must not only determine the answer but, more importantly, understand the cognitive processes or methodology used to obtain the solution. Learning media encompasses tools, methods, and tactics used to enhance the effectiveness of communication and interaction between educators and students in the educational process within the school environment (Sofi-Karim et al., 2023). Additionally, media serves an educational purpose by disseminating information imbued with educational principles (Semali, 2017; Ahmad, 2024).

This research is significant because it demonstrates that several students have trouble solving story problems. This is because they find it difficult to understand problems in the form of stories related to everyday life. Furthermore, some students perceive it as easier to solve problems when they use the media as a tool to assist them in understanding them (Kenedi et al., 2019). For example, in psychology, such an effect can be demonstrated by how a person's character (such as optimism or pessimism)

influences how they cope with stress and anxiety. Education can employ dispositional analysis to understand how students engage with the subject matter and the learning environment (Tempelaar et al., 2018; Tempelaar et al., 2020).

Several previous studies have examined mathematical dispositions, but none have specifically examined story problems in the LCM and GCF materials. Therefore, this study fills this gap by providing a novel approach to students' mathematical dispositions, specifically the issue of story problems. Building upon the results of the comparison of issues and previous research, this study aims to examine students' mathematical disposition in solving word problems related to the concepts of Least Common Multiple and Greatest Common Divisor.

2. METHOD

The research method used was a qualitative one, analyzing subjects in junior high school. The goal was to determine how they analyzed their dispositions when working on story problems related to the subject of LCM and GCF. The research was conducted in the seventh grade of MHI Bangsalsari Junior High School, with three students selected based on their abilities. The following section presents the flow of qualitative research methods used in this study, as illustrated in Figure 1.

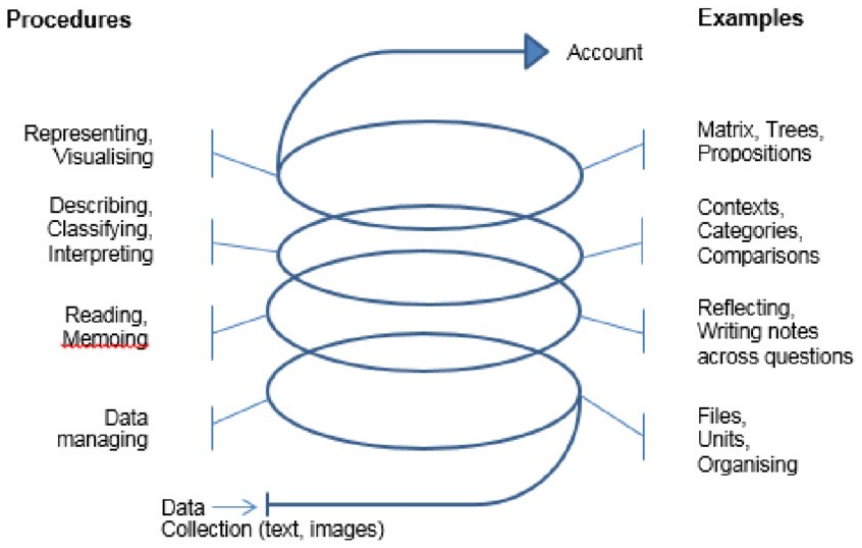

Figure 1. Flowchart of Qualitative Research Methods

Data collection involved four data collection methods:

1. Observation. The first observation was conducted with students during the learning process to identify problems they faced and assess their understanding of LCM and GCF. After conducting the observation, I identified the students' difficulties in working on and understanding story problems related to LCM and GCF.

2. Problem Study (Problem-Giving Problems). This problem study involved providing students with story problems related to LCM and GCF, then using congklak to determine whether congklak was effective in helping them understand the material.

3. Interviews. This was conducted to determine whether congklak could help students solve story problems related to LCM and GCF. 4. Documentation: used to take pictures and videos during research as evidence that it was carried out.

Furthermore, the data analysis used in this study is descriptive qualitative data analysis. This analysis presents junior high school students' mathematical dispositions through Congklak games on story problems in the LCM and GDF materials.

3. RESULTS AND DISCUSSION

Based on research conducted at junior high school MHI Bangsalsari, students had trouble solving word problems. The following results were obtained from observations, problem-solving questions, interviews, documentation, and the use of time triangulation:

Subject 1

Question: Hana has 25 green cookies and 30 blue cookies. She wrapped the cookies and sold them to her friends at school. How many packages of cookies can Hana make? How many layers and slices of cake per package? The results of students' work regarding their mathematical disposition to solve the story problems are presented in Figure 2.

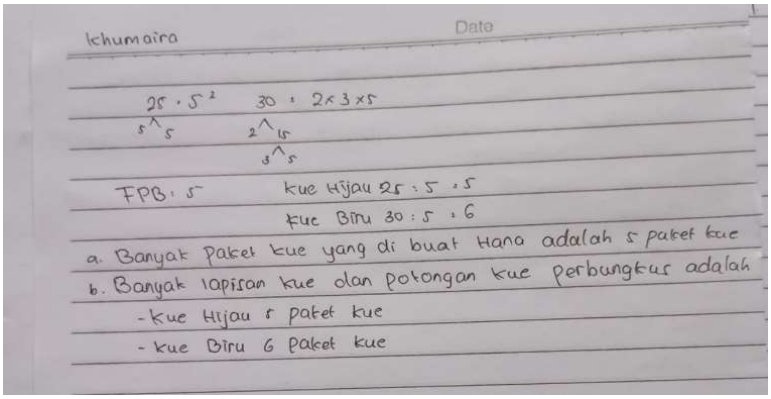

Figure 2. Results of Subject 1

Subject 2

Question: Farhan goes for a walk every 4 days, while Rio goes for a walk every 6 days. They went for a walk together on July 15, 2024. On what date did they go for a walk together for the second time? The results of students' work regarding their mathematical disposition to solve the story problems are presented in Figure 3.

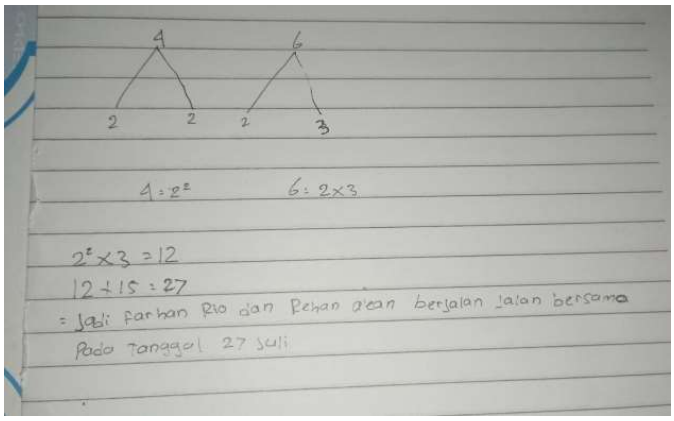

Figure 3. Results of Subject 2

Subject 3

Question: Jani goes to the minimarket every 4 days, and Rian goes to the minimarket every 6 days. If Jani and Rian go shopping together on Tuesday, when will they meet again to shop together? The results of students' work regarding their mathematical disposition to solve the story problems are presented in Figure 4.

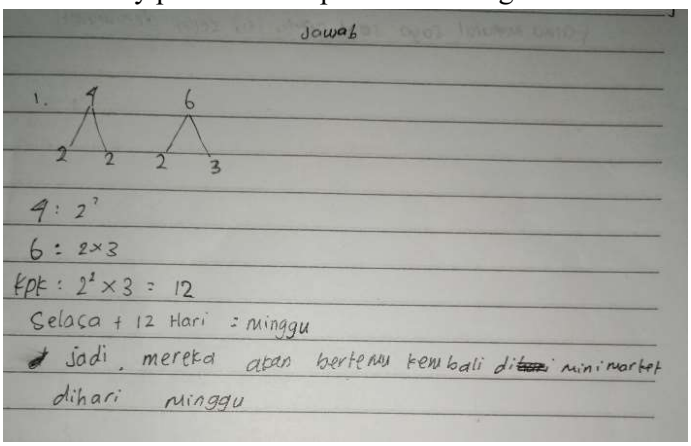

Figure 4. Results of Subject 3

Based on the results of the problem study (questions) and interviews, it can be concluded that:

1. Students consider word problems difficult to understand, and they are often very long.
2. The lack of learning media means they rely solely on student worksheets.
3. Using congklak significantly helps students solve problems with the least common multiple (LCM) and greatest common factor (GCF) because they find it easier to use the media.
4. With the media, they don't regard math as intimidating because they can solve problems through play or use the media as a learning aid.

This document outlines the procedures students should follow when using congklak media to solve LCM and GCF story problems. How to use congklak is as follows:

1. Prepare stones.
2. Insert the stones into the holes corresponding to the numbers in the problem. For example, if the GCF of 6 and 8 is 6 and 8, then fill the holes that are multiples of 6 and 8.
3. Then, the hole filled with two stones is the result.

By using this tool, seventh-grade students at junior high school MHI Bangsalsari found it easier to solve problems. Congklak is effective in helping students solve story problems and increasing their confidence in solving them. We have developed the congklak media for solving the problem in Figure 5.

Figure 5. Congklak Media

Congklak, as a traditional game, can be used as a learning medium for mathematics to help students understand basic mathematical concepts such as addition, subtraction, multiplication, and division (Ambarawati et al., 2024). This game can also improve students' numeracy skills, logical reasoning, and strategic thinking. By using congklak as a medium, mathematics learning becomes more enjoyable, easier to understand, and relevant to students' daily lives (Sari et al., 2019).

The traditional game of congklak serves several purposes, including helping children recognize numbers and introducing them to simple mathematics found in everyday life (Siregar et al., 2014; Prasetyo & Hardjono, 2020). Everyday life frequently employs arithmetic operations, which serve as the basis for comprehending subsequent mathematical concepts. Especially in mathematics lessons, which are inextricably linked to numbers, to ensure concepts are embedded and retained in students' minds, learning needs to involve students in action, rather than simply memorizing and memorizing the material.

Involving students in the learning process helps them enjoy mathematics, allowing teachers to use traditional games like congklak (Sahrunayanti et al., 2023; Rahmasari et al., 2023). Congklak can be used to teach the concepts of LCM and GCF (Sajida et al., 2024). The use of congklak in mathematics learning can improve students' abilities in learning mathematics, which is often considered a difficult subject. The implications of

this research can help teachers explain topics by providing learning media that facilitate student understanding.

4. CONCLUSION

This study concludes that the congklak game is an effective medium for increasing students' interest in mathematics during the learning process in grade VII of junior high school MHI Bangsalsari. This congklak game assists educators in explaining the material, because this learning medium facilitates student understanding. The equipment or media for this game is very adaptive, because it can use surrounding objects. If there is no congklak board, someone can replace it by digging a small hole in the ground, making a circle shape on the surface, and using small pebbles or alternative grains as substitutes for seeds.

As a recommendation, the results of this study can serve as a reference and guide for mathematics teachers in the use of instructional media that impact learning outcomes. Further research suggests developing interactive media by comparing it with congklak media in other subjects.

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