Jurnal Pendidikan Matematika
https://doi.org/10.22342/jpm.v18i3.pp469-484

Exploring Students' Critical Thinking Skills in Geometry through the Context of Betawi Culture: Damdas 3 Batu Game

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Abstract

One of the demands of 21st century learning is critical thinking. However, nowadays, students' critical thinking skills are still relatively low, particularly in geometry. This research aims to explore students' critical thinking skills through the design of a series of lessons. Realistic Mathematics Education (RME) underlies the design and the context applied. This study was conducted in one of the elementary schools in Jakarta, involving 30 grade IV elementary school students as the research subjects. The method used in this research is descriptive qualitative with an educational ethnographic approach. Data collection techniques involved observation, interviews, and documentation. The results of this study indicate that the implementation of a traditional game-based learning design called *Damdas 3 Batu* can support students' critical thinking skills. Through this game, students are able to comprehend the given problems, construct mathematical models adapted to the provided context, solve the problems, and ultimately derive conclusions from the obtained results. Therefore, *Damdas 3 Batu* can serve as a valuable instructional reference for teaching geometry concepts in elementary schools.

Keywords: Betawi Culture, Critical Thinking, Geometry, RME

How to Cite: Utami, A. M., & Pramudiani, P. (2024). Exploring students' critical thinking skills in geometry through the context of Betawi Culture: Damdas 3 Batu Game. *Jurnal Pendidikan Matematika, 18*(3), 469-484. https://doi.org/10.22342/jpm.v18i3.pp469-484

INTRODUCTION

Mathematics is a subject integrated into the curriculum in Indonesia. According to Van den Heuvel-Panhuizen & Drijvers (2020), mathematics is a human activity. Thus, it can be interpreted that everything in human life, including daily activities, cannot be separated from mathematics. This opinion is in line with Arseven (2015) assertion that mathematics is crucial for life. For example, in everyday tasks, humans use mathematics. This means that mathematics focuses on understanding, problem solving, and analytical abilities. Hence, mathematical proficiency is highly essential in education as it enables individuals to effectively tackle mathematical problems (Kandeel, 2021).

Critical thinking is one of the important skills in learning mathematics. This aligns with the viewpoint of Kek & Huijser (2011); Güner & Erbay (2021), who stated that learning mathematics involves several skills, including problem-solving techniques, problem identification, and making a statement if the information is incomplete. In this sense, critical thinking skills and mathematics are integral parts of people's lives, especially students. Kirmizi et al., (2015) and Schooner et al., (2017) emphasize that critical thinking is crucial for problem-solving. Facione (2011) further supports this view, defining critical thinking as a cognitive process aimed at validating, expanding upon, and resolving a specific issue. Consequently, an individual who can independently solve a problem exemplifies the essence of a critical thinker.

However, according to Setiana et al., (2021), students' critical mathematical thinking in Indonesia is still quite low, affecting their understanding of mathematics in schools. This is considered reasonable

Received Maret 23, 2024; Revised May 14, 2024; Accepted September 3, 2024

because learning is less varied, leading students to perceive mathematics as difficult and resulting in a lack of interest in the subject. This is in line with Code et al., (2016), who asserted that mathematics often receives negative responses due to its perceived difficulty. Since mathematics is taught in elementary school in a formal setting, students' exposure to the subject differs from what they experience in their daily life (Arytunova & Gykasyan, 2021; Verschaffel et al., 2020). This situation can arise when teachers' instructional methods do not begin with foundational concepts. Frequently, teachers simply present formulas without elucidating their origins, leading to a deficiency in students' critical thinking skills (Runnalls & Hong, 2020). One way to do this is by integrating the culture into the learning process.

According to Nieminen & Atjonen (2023), through the perspective of local culture, students will appreciate mathematics more in the learning process. This view is also confirmed by Sumarni & Kadarwati (2020) suggest that blending cultural elements with mathematics instruction positively impacts students, helping them connect with their own culture. This will help create a learning environment that is connected to students' experience and hopefully encourages critical thinking in mathematics classes.

Education and culture play pivotal roles in nurturing the noble values of a nation and molding an individual's character in alignment with these values (Chankseliani et al., 2021). This is because education and culture are inextricably linked to human existence, much like two halves of a single coin. As demonstrated by the research conducted by Samo et al., (2018) and Simamora et al., (2018), integrating mathematics education with local culture can have a positive impact on students' critical thinking abilities and enable them to learn mathematics while understanding their culture. As a result, a teaching strategy that integrates learning mathematics with local culture is required.

Local wisdom-based learning was first proposed by D'Ambrisio, a Brazilian mathematician (Raj, 2017). The learning approach between mathematics and culture can be associated with RME, more commonly known in Indonesia as Pendidikan Matematika Realistik Indonesia (PMRI). As in learning through context, there are also characteristics of PMRI as delineated by Fauziah et al., (2020), is characterized by (1) exploration of contextual problems; (2) construction of models or scaffolds with vertical instruments; (3) utilization of student-generated results and contributions; (4) interactivity; and (5) intertwinement with other learning topics. Therefore, through the PMRI approach model adapted from RME, students can seamlessly connect their cultural heritage with mathematical concepts, so that educators can instill the nations' cultural values that have an impact on character education.

Various cultural contexts have been utilized in mathematics learning, including the traditional game. The *Bicau* game from Bengkulu (Puspitasari et al., 2020) is a traditional game that can be utilized for teaching geometric concepts and for training students in problem-solving skills. The marbles game or *Gundu* in Indonesia (Jaelani et al., 2013) has been used in teaching units of distance, while the *Dakocan* game from Palembang (Nursyahidah et al., 2013) is employed in teaching additional up to 20, among many others. However, there is still limited discussion on traditional games in Betawi culture,

particularly in geometry concepts. Therefore, in this study, the researchers used *Damdas 3 Batu* as one of traditional game in Betawi culture as an instructional tool for geometry lessons.

According to Puspitasari et al., (2020), Damdas is a traditional game of Betawi (Jakarta) that uses stones as pawns. The gameplay of *Damdas 3 Batu* resembles that of chess but with a more straightforward concept. Similar to playing chess, this game is designed for two players on pairs, suitable for both men and women. The properties used to play *Damdas* game are quite simple, consisting of grid boards and pawns. These grid boards can be made from paper, cardboard, or other similar materials, while pawns can consist of grains, chips, or other objects with varying shapes or colors to distinguish between players. Previous research conducted by Masruroh & Isnaini (2022) on instructional media like *Damdas*, known as *Damdaman*, revealed that the use of traditional game-based media has a positive impact on cognitive understanding. Additionally, research by Puspitasari et al., (2020) on the use of the *Bicau* game as an instructional medium indicated that *Bicau* can help train students' ability to develop strategies for solving problems.

This research represents a novel endeavor in the field, distinct from previous studies that focused solely on learning outcomes and the analysis of *Damdas* learning media. Here, the aim is to explore students' critical thinking abilities in mathematics learning, particularly in conceptual geometry topics integrated with the Betawi cultural local wisdom game *Damdas 3 Batu*. The purpose of this research is to utilize *Damdas 3 Batu* game as a setting to explore students' critical thinking skills specifically in geometry topics. This research also aims to serve as a reference for future research and as a developing knowledge for teachers related to learning media based on local wisdom in mathematics subjects in elementary schools.

METHODS

This study focuses on elementary school students' critical thinking skills within the domain of mathematics, utilizing the traditional Betawi Culture game, *Damdas 3 Batu* (Figure 1), as a series of learning lessons designed for grade IV students. There were 30 students enrolled in one of the East Jakarta elementary schools. In consideration of research ethics, the name of the school is changed into SDS 02 by the researchers. This study employs descriptive qualitative methodologies using an educational ethnographic approach to investigate its topic. The ethnographic approach, a technique in qualitative research, is particularly useful for comprehending the culture of a certain community setting (Parker, 2018). Therefore, the educational ethnography approach is simply interpreted as understanding the culture within educational environments, encompassing classrooms, schools, and universities.

This research was carried out in the even semester of 2023/2024 academic year, following a structured process include: 1) Preparation stage involved scheduling the research, arranging collaboration with teachers, and determining the research subjects. 2) The implementation stage involved the researchers' initiating fieldwork and serving as the data collectors. Data collection

techniques included observation, wherein the implementation involved the use of a written test instrument that had been validated by an expert of mathematics education before being administered to students. The validation result showed that the written test questions are categorized as good and can be administered to students during the research data collection process. Interviews were conducted with 9 students as representatives and were documented in the form of photos and videos as evidence of the research. These three data collection techniques ensured a comprehensive data set comprising written responses and visual evidence. 3) The data processing stage involved the researchers analyzing the collected data using triangulation techniques. This process enlisted aligning the results from field observations, interviews with subjects, and documentation from photographs and videos to draw conclusions regarding the research findings. Critical thinking skill assessments were employed to assess the students' responses, as shown in Table 1.

Table 1. Critical thinking indicators

Critical Thinking Skill Indicator	Description
Interpretation	Students' ability to articulate what is known and what is being asked in the problem.
Analysis	Identify the statements presented in the given problem by constructing a mathematical model and furnishing suitable explanations.
Evaluation	Solve problems correctly and completely.
Inference	Make conclusions appropriately.

(Facione, 1990; Arini et al., 2023)

Table 1 shows the indicators of critical thinking skills. For the first indicator, the researchers assessed whether students could write down what is known and what is asked on the problem. In the second indicator, the researchers evaluated whether the students could identify statements from the problem listed and then converted them into mathematical forms. In the third indicator, the researchers assessed whether the students were able to solve problems. Then, for the last indicator, the researchers evaluated whether the students could write conclusions. Therefore, it can be concluded that critical thinking skills are determined based on students' skills to understand, identify, solve problems, and draw conclusions. The category of critical thinking skills can be seen in Table 2 below.

Table 2. Category of critical thinking

Category of Critical Thinking		
Low	Medium	High
(< 65)	(65 – 79)	(80 – 100)

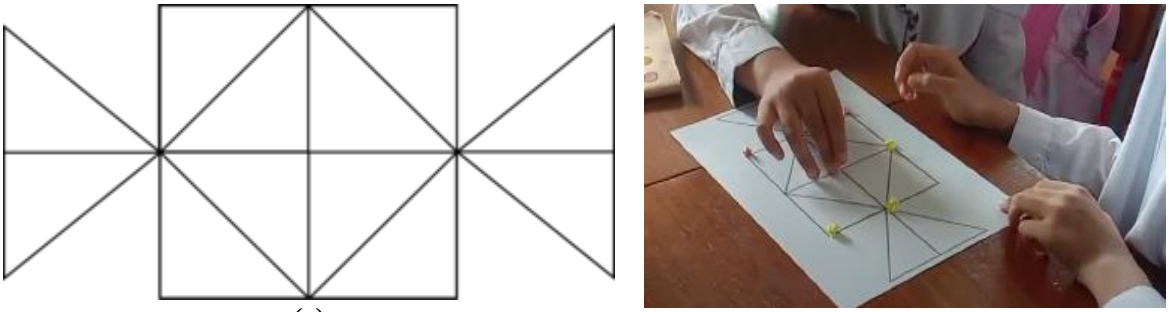
(Kementerian Pendidikan dan Kebudayaan, 2017)

Table 2 outlines the three levels of students' critical thinking skills according to the Ministry of Education and Culture (*Kementerian Pendidikan dan Kebudayaan*), namely low, medium, and high categories. In the low category, students' assessment results indicate the scores are less than 65, while in the medium category, students' assessment results are within the range of 65–79, and in the high-level critical thinking ability category, students' assessment results are within the range of 80–100. In conclusion, determining students' critical thinking skills based on the scoring results according to students' performance in solving problems is in line with critical thinking ability indicators.

RESULTS AND DISCUSSION

Damdas 3 Batu Game as a Context for Learning Geometry

Figure 1 (a) is an illustration of Damdas 3 Batu game which served as the starting point for the learning lessons in this study. Students played Damdas 3 Batu game in pairs. Before starting the game, students conducted a draw to determine who would move their pieces first. According to Figure 1 (b), the grid in the implementation activity used paper, while the pawns used paper spheres of different colors.



(a) (b)

Figure 1. (a) Damdas 3 Batu Game; (b) Students played Damdas 3 Batu game in pairs

Damdas 3 Batu is not only enjoyable but also trains students' critical thinking skills. In addition, *Damdas 3 Batu* game can also be used as a context for learning mathematics, especially geometry. Geometry, which often begins with the concept of a point, can be effectively taught using this game. It can be seen in Figure 2, the students were invited to identify the geometric shapes on the *Damdas* board.

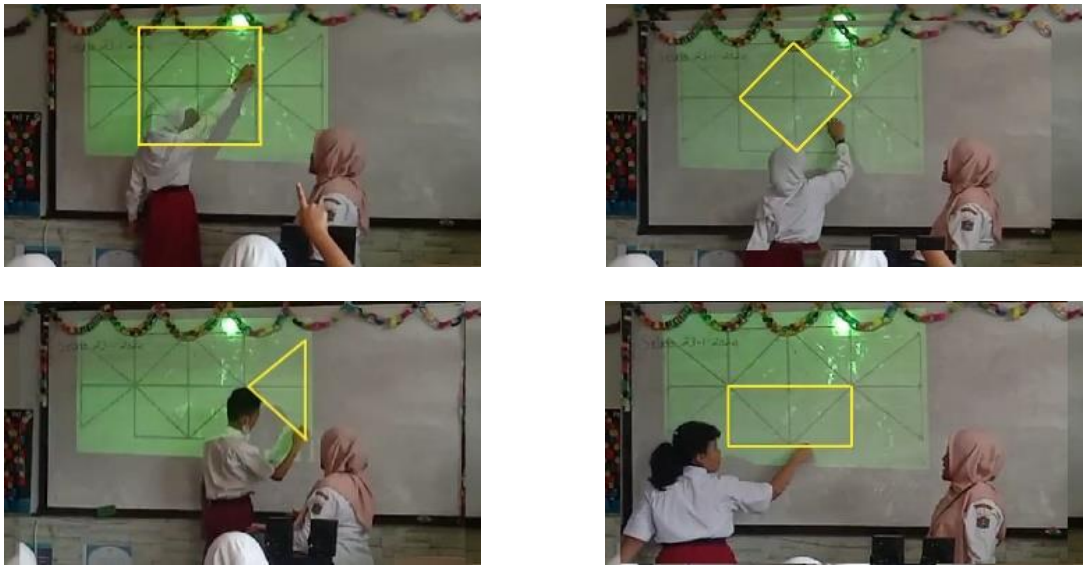
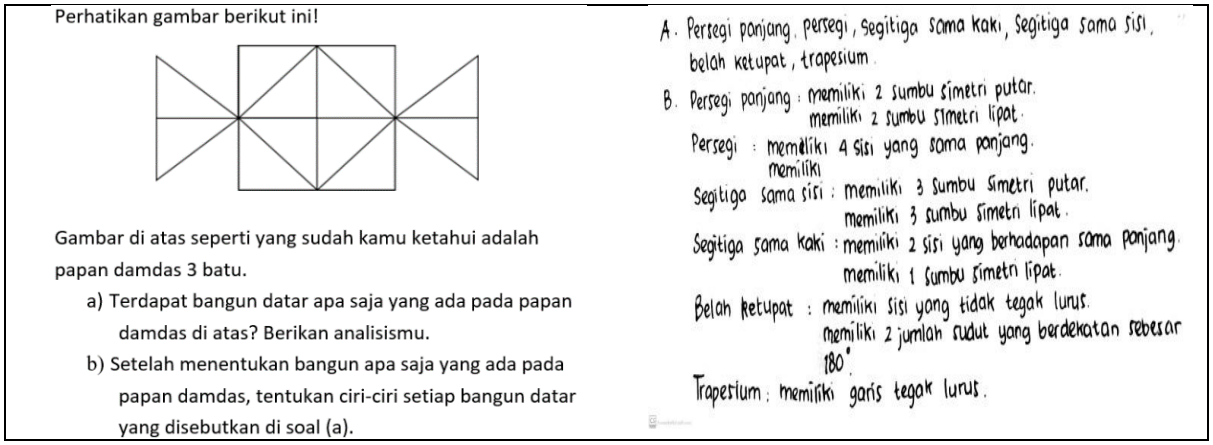


Figure 2. Students were looking for geometric shapes that exist on the Damdas board

According to Figure 2, through the class' discussions, students could identify the geometric shape on *Damdas* board displayed through the projector. The discovery of geometry on *Damdas* board was made during discussion. (*Note: T=Teacher, S: Student*)

T : *From the picture of Damdas board displayed in front of class, try to determine what shape is it!*
S1 : *Square, Ma'am.*
T : *Please show it on the board.*
S1 : *(Showing the square on the board as in Figure 2 (a))*
T : *Okay, well. Then can anyone show another geometric shape?*
S2 : *Rhombuses, Ma'am." (While showing a rhombic shape as in Figure 2 (b))*
T : *Okay, thank you. Next, there is a flat shape, what else besides square and rhombus?*
S3 : *As in Figure 2 (c) Triangle, Ma'am.*
T : *What triangle is it?*
S3 : *Isosceles triangle, Ma'am.*
T : *Well, thank you. Has anyone else found another flat build on this Damdas board?*
S4 : *Rectangle, Ma'am, as shown in Figure 2 (d).*
T : *Good, thank you everyone, applause for all of us.*

After the discussion session, students were asked to solve written problems prepared by the researchers. As shown in Figure 3, students could identify six types of shapes on *Damdas 3 Batu* board: rectangle, square, isosceles triangle, equilateral triangle, rhombus, and trapezoid. Students were also able to describe the type of shape and write down the characteristics of each shape though in not detail.



Translated into English:

a. What flat shapes are on the Damdas board above? Give me your analysis.
b. After determining what shapes are on the Damdas board, please determine the characteristics of each flat shape mentioned in question (a).

Answers:

a. Rectangle, square, isosceles triangle, equilateral triangle, rhombus, and trapezoid.
b. Rectangle = has 2 axes of rotary symmetry and has 2 axes of fold symmetry
Square = has 4 sides of equal length
Equilateral triangle = has 3 axes of rotary symmetry and has 3 axes of fold symmetry
Isosceles triangle = has 2 opposite sides of equal length and has 1 axis fold symmetry
Rhombus = has sides that are not perpendicular and has 3 number of angles that adjacent by 180°
Trapezoid = has a perpendicular line

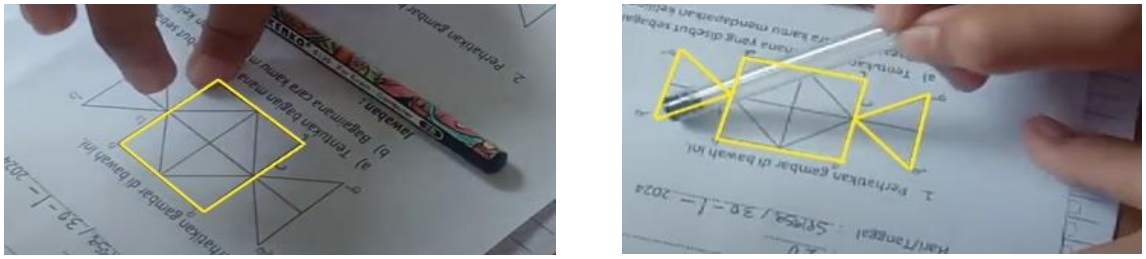
Figure 3. The student's answer in describing the type of geometric shape and their characteristics

Based on the students' answers in Figure 3, it is evident that the responses were still incomplete. One shape, a right triangle, was not mentioned by the students. This answer is explained in more detail in discussion. (*Note: T=Teacher, S: Student*)

T : *Can you identify what kind of shapes in the picture?*
S5 : *There are square, rectangular, equilateral and isosceles triangles, rhombuses, and equal trapezoid.*
T : *Okay, are there any other shapes beside them?*
S5 : *Hmmmm. (he was thinking for a while), Oh yes, right triangle.*
T : *Why didn't you write it in your answer?*
S5 : *Hehe, I forgot, Ma'am.*

The Context of the Damdas Board as an Introduction to the Perimeter and Area

In addition to being used as a context for introducing the types of shapes, *Damdas 3 Batu* board media can also be used as a context for introducing the concepts of perimeter and flat-shaped area. The circumference is the sum of the total length of the sides that make up the shape. Meanwhile, the flatshaped area can be identified as the amount of space owned by the shape. In Figure 4, students were asked to determine the circumference of the *Damdas* board picture in the problem. For more details, a short interview with students was held as follows.

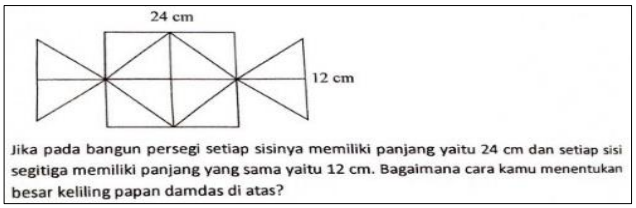


(a) (b)

Figure 4. The students determined the perimeter and area of a shape

T : *Can you determine which one is the perimeter of the Damdas board picture?*
S6 : *This one? (He answered hesitantly and just pointed to the perimeter of the square).*
T : *Are you sure?*
S6 : *Uh, no, hmmm. I don't know, Ma'am.*
S7 : *Ma'am, I want to help him. From this to this. In Figure 4 (b) Student 7 pointed the perimeter of the Damdas board.*

Furthermore, the students were given questions to assess the extent of their critical thinking regarding the concepts they had encountered. The form of the question given is shown in Figure 5.

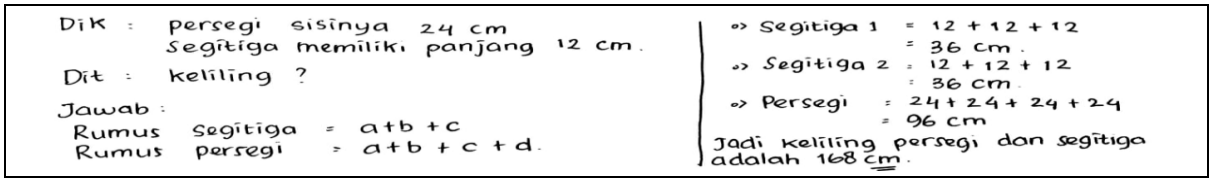


Translated into English:

If on a square shape, each side has a length of 24 cm and each side of the triangle has the same length, which is 12 cm. How do you determine the perimeter of the Damdas board above?

Figure 5. The problem about the perimeter in Damdas board

As seen in Figure 6, the student could determine what is known by stating square side is 24 cm and the triangle side is 12 cm. She could also determine what is asked as perimeter. She then elaborated her answer by deriving the formulas for the triangle and square, summing up the sides of the two triangles and the square. Finally, she calculated the perimeter by summing up the lengths of all the triangles and the square.



Translated into English:

What is known = Square side 24 cm, The triangle has a side length of 12 cm
What is asked = perimeter
Answers:
Triangular formula = a + b + c
Square formula = a + b + c + d

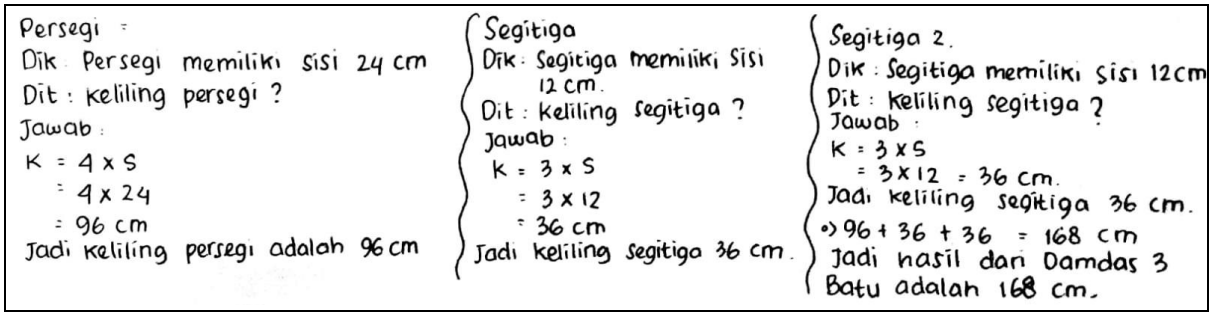
Triangle 1= 12 + 12 + 12 = 36 cm
Triangle 2= 12 + 12 + 12 = 36 cm
Square= 24 + 24 + 24 + 24 = 96 cm
So, the perimeter of a square and a triangle is 168 cm

Figure 6. Student 8's answer in worksheet

According to Figure 6, student 8 is already in the category of having critical thinking skills, which include students' ability to interpret, analyze, evaluate, and conclude. In Figure 6, student 8 was able to write down what is known and asked in the problem. She was also able to write formulas and mathematical models, then calculate the mathematical problem and provide conclusions to the answers she encountered. To explore student 8's answer, conducted an interview with her through the following discussion. (*Note: T=Teacher, S: Student*)

T : *What is known from the problem?*
S8 : *The length of the sides of the square and triangle, Ma'am.*
T : *Okay, how much is each side?*
S8 : *Square side is 24 cm; triangle side is 12 cm.*
T : *Good… next how do you calculate the perimeter?*
S8 : *I added up first one by one, then added up all the results.*

It is evident from Figure 6 that student 8 accomplished this by summing up all the sides of the shape. However, student 7 accomplished it by multiplying the number of sides by the known side length given in the problem, as shown in Figure 7. Both answers were similar, albeit with a slightly different solving problems process.



Translated into English:

Square:
What is known= the square has sides 24 cm
What is asked= square perimeter?

Answers:
K= 4 x s = 4 x 24 = 96 cm
So, the perimeter of square is 96 cm

Triangle 1:
What is known= the triangle has 12 sides cm
What is asked= triangle perimeter?
Answers:
K= 3 x s = 3 x 12 = 36 cm
So, the perimeter of triangle is 36 cm

Triangle 2:
What is known= the triangle has 12 sides cm
What is asked= triangle perimeter?
Answers:
K = 3 x s
K = 3 x 12 = 36 cm
Total:
96 + 36 + 36 = 168 cm
So, the result of Damdas 3 Batu is 168 cm

Figure 7. Student 7's answer on worksheet

For this reason, further explanation can be found in the following interview. (*Note: T=Teacher, S: Student*)

T : *So, what is known and asked from the question?*
S7 : *Hmm… what is known is square and triangular sides, Ma'am. Then, what is asked is perimeter.*

T : *Okay, it has been written. Why did you solve these one by one for each shape?*
S7 : *Yes, Ma'am, I did it one by one first.*
T : *Well, why is this formula multiplied?*
S7 : *Hehehe (he smiled) because I just followed what I was taught, Ma'am.*
T : *Why did you not add all sides? Which one is easier for you?*
S7 : *It is the same, Ma'am.*

After the interview, Student 7 found that both using the strategy by adding all sides of the shape and by multiplying the number of sides by the size of the side were equivalent. Student 7 didn't find any difficulty in using both strategies. Moreover, Figure 8 depicts the problem of determining the area on the *Damdas 3 Batu* board drawing. The problem took students from the contextual situation of *Damdas* shape to the formal form of mathematics, encompassing the general formula and students' problem-solving approaches.

Berdasarkan gambar, bangun datar di atas merupakan bentuk yang mirip dengan papan damdas 3 batu yang kemarin sudah kamu mainkan. Ayo pikirkan bagaimana cara kamu menentukan luas bangun tersebut dalam cm^2.

a) Jika bangun persegi setiap sisinya memiliki panjang 6 cm, berapa banyak persegi dalam cm^2 yang disusun secara tegak dan mendatar?
b) Jika bangun segitiga setiap sisinya memiliki panjang alas 5 cm, tinggi 3 cm. berapa banyak persegi dalam cm^2 yang disusun secara tegak dan mendatar?
c) Berdasarkan jawaban (a) dan (b) dapatkah kamu menuliskan rumus penyelesaian luas masing-masing bangun datar?
d) Berikan kesimpulanmu dari hasil jawaban tersebut.

Translated into English:

Based on the picture, the flat shape above is similar to Damdas 3 Batu board that you played yesterday. Let's think about how you determine the area of the shape in cm^2.

a) If the length of square of each side is 6 cm, how many squares in cm^2 are arranged vertically and horizontally?
b) If each side of triangular has a length of 5 cm, height of 3 cm, how many squares are in cm^2 arranged vertically and horizontally?
c) Based on the answers (a) and (b), can you write the formula for solving the area of each shape?
d) Give your conclusions from the results of the answer.

Figure 8. Determining the area of a plane figure

In Figure 8, the students were asked to arrange the number of squares in cm^2 arranged vertically and horizontally. The expected outcome, as depicted in Figure 9, was that students would arrange the squares to fill the entire areas of shapes. However, there were still many students who had difficulty arranging it, especially arranging a triangle shape. The difficulty stemmed from the students' lack of clear understanding. Consequently, the teacher provided further explanation on how to arrange the number of squares in square centimeters until they achieved a clearer understanding.

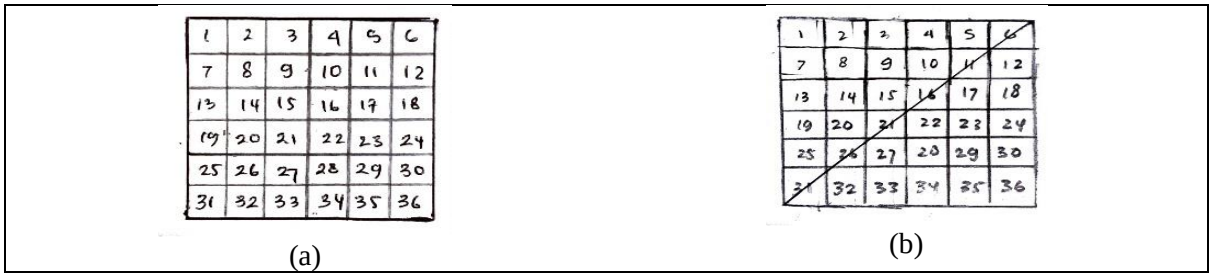
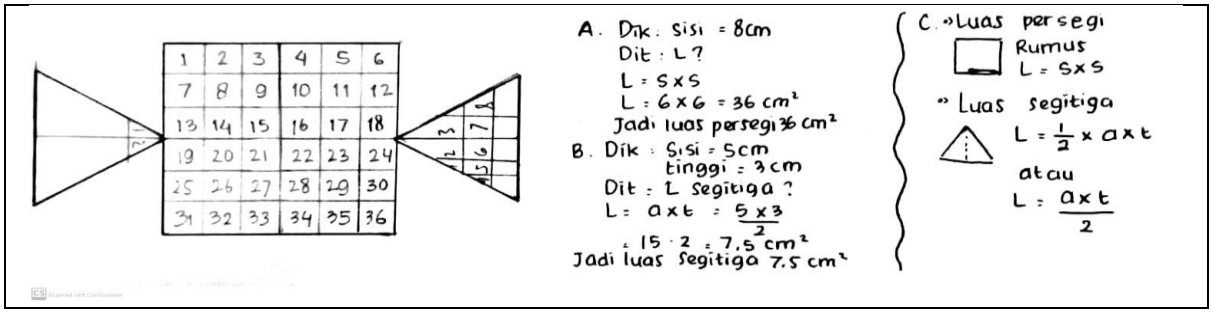


Figure 9. The example of square arrangement in cm2 vertically and horizontally

Figure 10 shows the result of students' answers when solving the problem. Similar to the previous questions that emphasized critical thinking skills, students were accustomed to writing down what is known and what is asked in the question to write their conclusions. However, based on student 3's answer in arranging the number of squares in cm^2 on the triangle shape remains incorrect.



Translated into English:

a. What is known = side = 8 cm
What is asked = Area?
A = s x s = 6 x 6 = 36 cm^2
So, area of square is 36 cm^2

b. What is known = side = 5 cm, high = 3 cm
What is asked = Area of triangle?
A = a x t/2 = 5 x 3/2 = 7,5 cm^2
So, area of triangle is 7,5 cm^2

c. Area of square
the formula = s x s
Area of triangle
the formula = ½ x a x t or a x t/2

Figure 10. Student 3's answers on worksheet

The answer of student 3 was elaborated through the following discussion. (*Note: T=Teacher, S: Student*)

T : *For the answer a, b, and c are good. But why when arranging squares in cm^2 in the triangle, the answer has not been found?*
S3 : *Yes, Ma'am, because I'm still confused about making the boxes.*
T : *Like what?*
S3 : *If it's square, I already understand, measure it using a ruler. Keep making the squares. If the triangle, I am confused, Ma'am.*
T : *Okay, now how long the base and the height of the triangle?*
S3 : *5 cm, Ma'am. The height is 3 cm.*
T : *Put a dot every 1 cm for the base. The height is also the same. Draw a line in the middle to determine the height of the triangle, measuring 3 cm.*
S3 : *After that, we draw the squares, right Ma'am?*

T : *That's right, for those that form like right triangles are calculated* $\frac{1}{2}$*, so if there are 2 triangles calculated how much?*

S3 : *It is calculated 1 (square).*

Damdas 3 Batu Can be Used in Learning Angular Quantities

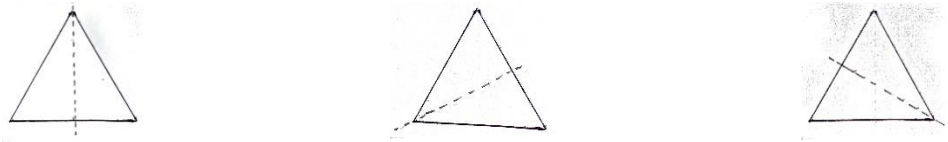
In geometry, angle is defined as the magnitude of a line segment from its base point (Nabavi & Fossen, 2021). In a full circle, the angle measures 360°, while in a semicircle, the angle measures 180°. Angles are classified into three types: taper angle, obtuse angle, and right angle. A protractor can be used to measure the magnitude of the angle. Square has a total angle of 360° while a triangle has a total angle of 180°. The *Damdas 3 Batu* board can serve as a context for teaching angle measurement to students. Students can measure each angle on the shape formed by squares and triangles using a protractor as shown in Figure 11.

Figure 11. Students practice measuring the magnitude of angles using a protractor

Damdas 3 Batu Can be Used to Study Fold Symmetry

By using *Damdas 3 Batu*, students can learn about the symmetry of squares and triangles. In this activity, students were asked to fold square and triangular paper as these shapes are integral to the *Damdas 3 Batu* games board, as shown in Figure 12 below. While students explored fold symmetry, interviews were conducted to gain further insights into their understanding.

(a)



(b)

Figure 12. (a) Students try to find the fold symmetry of the triangle; (b) The illustration described by the students involved folding a triangle into two parts to determine the line of symmetry

T : *Please determine the symmetry of this triangular fold!*
S9 : *Emm, first like this. Second like this, third like this, ma'am (See Figure 12(b).*
T : *That's right, so folding symmetry is what it looks like?*
S9 : *Emm, which cuts into 2 parts ma'am, but must be the same both.*

Based on the results of the study, it can be shown that the context of *Damdas 3 Batu* game can introduce local wisdom in mathematical learning. This aligns with Chankseliani et al., (2021) statement, which claimed that education and culture can be integrated. Thus, it demonstrates that the incorporation of indigenous cultural games can facilitate the process of learning geometry. Geometry is a domain of mathematics extensively employed not only within its own discipline but also across various other scientific fields (Masfingatin et al., 2020). In this case, students were able to name various geometric shapes. As mentioned by students, types of geometric shape include squares, rectangles, triangles, trapezoids, parallelograms, rhombuses, kites and circles.

The incorporation of education and culture is expected to support students' critical thinking skills. This is because critical thinking is highly essential in mathematics learning. According to Kirmizi et al., (2015) and Schooner et al., (2017), critical thinking can assist in problem-solving. Critical thinking indicators proposed by Facione (1990) and Arini et al., (2023) indicated that there are four indicators that students must master to be categorized to have critical thinking skills, namely interpretation, analysis, evaluation, and conclusion. In fact, in the preliminary study conducted before the main research, most students were unable to fulfill the first indicator (interpretation), where students should be able to state what is known and what is being asked. This is because they were not accustomed to writing down what is known or asked.

In the subsequent session, when presented with problems, most students fulfilled the indicators of interpretation, analysis, evaluation, and conclusion. Facione (1990) and Arini et al., (2023) considered that to possess critical thinking skills, students must master these four indicators. However, there were some students who did not meet the final indicator, which involves drawing conclusions. This occurred because they were not accustomed to summarizing their answers.

Based on the research findings, it has been proven that the use of *Damdas 3 Batu* game can be employed as an instructional learning lesson design to support students' critical thinking skills. Furthermore, *Damdas* board can be used as an effective learning media for teaching geometrical concepts. According to Rahma et al., (2021), learning media is used to facilitate learning activities during the learning process. In addition, the use of game media can change students' perceptions about mathematics. Students feel that using *Damdas 3 Batu* media learning mathematics is more enjoyable and less tedious. This observation is also reinforced by the opinion of the class teacher, who noted that using game media, especially *Damdas 3 Batu* which is well-known in Jakarta makes learning geometry more engaging for students. This aligns with Masruroh & Isnaini (2022), who found that using the *Damdaman* game can enhance cognitive thinking. The novelty in this study lies in employing the

Damdas 3 Batu game not only to improve learning outcomes but also to support students' thinking skills in geometry learning.

CONCLUSION

The utilization of the *Damdas 3 Batu* game can be employed as a setting to support critical thinking abilities among students, particularly in grasping geometric concepts. This assertion is supported by the research outcomes indicating students' proficiency in identifying, solving problems, and drawing conclusions from the written test questions provided. However, some students still lack critical thinking skills. This deficiency is attributed to their unfamiliarity with the types of questions and their lack of habit in drawing conclusions from their answers. Therefore, it is necessary to establish a habit of practicing problems that can stimulate students' critical thinking abilities, as well as the utilization of mathematical contexts familiar to students, such as traditional games. Although this research yields some insights into students' thought processes, it already represents the learning design. This study can serve as a reference for further research on the issues related to critical thinking abilities and as a resource for mathematics teachers in geometry learning.

ACKNOWLEDGMENTS

The authors extend their sincere gratitude to the teacher and students at SDS02 Jakarta who participated as the research subjects and provided invaluable assistance throughout the study. Additionally, the authors would like to express deep appreciation to the colleagues at Universitas Muhammadiyah Prof. DR. HAMKA for the generous support in completing this research.

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