Student's creativity through the guided discovery-based task to eliminate mathematics difficulties

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A R T I C L E I N F O	A B S T R A C T
	Many students had difficulties in learning mathematics. The students have a problem in determining the divided lines, the height lines, and the weight lines in triangles by using the term. The lack of creativity is also a factor in the difficulty. This study aims to find out the creativity of students through the guided discovery-based task of the line in the triangle to eliminate the stress learning the material. The method used activity observation in completing the work by drawing according to the student's creativity indicator and the guided discovery-based task about a step of the divided lines, the height lines, and the weight lines in a triangle. It also uses task-based interviews. The result of the observation is that the students perform the activities according to the guided discovery step, namely stimulation, problem statement, data collection, data processing, verification, and generalization. Some students fall into the creative category. The result of the interview shows that students' difficulties eliminated with guidance according to guided discovery step. The conclusion is that students are creative with guided discovery based on the task of the concept of the triangle and can eliminate the difficulty of mathematics.

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1. INTRODUCTION

Students often have difficulties in understanding concepts (Kumalasari et al., 2013) because teachers often do not demonstrate depicting a build using tools such as rulers, bows, and drawing compass. The teacher asks merely the students to read the material and look at the drawings in the textbook so that students sometimes feel lazy to ask even if they do not understand. When they see the task of asking them to draw, they are quiet for a long time, trying to remember, sometimes talking to their peers about the picture and trying to ask for help. In previous studies, there were many difficulties felt by students, especially for some low-ability students in determining the divided lines, the height lines, and the weight lines in angular lines by depicting them on paper (Jordan et al., 2010). Although they are not familiar with the concept of these lines because they remember that teachers have mentioned it in learning, they still need guidance in a drawing.

Guided-Discovery Learning method is a learning method that involves students actively trying to find their information and knowledge expected with the guidance and instruction of teachers

(DeDonno, 2016). The learning steps are as follows. First is a stimulus (to ask questions or encourage students to observe images or read books about the material). Second, problem statement (allowing the students to identify as many problems as relevant to the lesson material, then selecting and formulating it in the possible form). Third, data collection (providing opportunities for students to collect information). Fourth, data processing (processing data obtained by students). Fifth, verification (conduct a careful examination to verify whether or not the hypothesis is correct); and (6) generalization (conclude).

Guided discovery involves a therapeutic dialogue designed to assist clients in finding their solutions to their problems (Simamora et al., 2019). An integration of problem-solving therapy and the Socratic method can help clients to develop their coping skills (Badriani et al., 2022). Problem-solving therapy provides a useful framework for helping clients to manage many of the problems they typically encounter (Hillmayr et al., 2020). The Socratic method provides a useful therapeutic style to promote self-guided discovery and self-regulation—strategies from the Socratic method used to guide the process of the therapeutic dialogue. At the same time, the stages of problem-solving serve as the structure for the content of therapy sessions (Overholser, 2013).

Creative is doing an activity characterized by four components, namely: fluency (lowering many ideas), flexibility (turning perspective quickly), originality (composing something new), and elaboration (developing another concept of an idea) (Moma, 2015). The ability to think creatively is the new mindset ability acquired by experimentation and characterized by fluent, flexible, original, and elaborate thinking skills (Dinni, 2018).

Creative processes that take place can create creativity products. Creativity is the ability to make new combinations based on existing data, information, or elements (Simamora et al., 2019). The results obtained are not always desired from something completely new, but can also be a combination of ideas that already exist from the experience and knowledge that has been owned by individuals (Munandar, 2009). Creative individuals have the following characteristics: (a) aptitude is a feature related to cognition or thought processes, and (b) non-aptitudes a characteristic that pays more attention to attitudes or feelings, motivations, or impulses from within to do something (Sari et al., 2021).

Piaget stated:" the principal goal of education is to create men who are capable of doing new things, not merely of repeating what other generations have done, men who are creative, inventive, and discoverers (Mulyasa, 2004). Guided discovery of creative high school female students of Ahvaz in the previous research involved group discussion method, one of the methods apply is also introduced as active learning and increases creativity and innovational skills in students (Heidarie et al., 2011)

The purpose of this study was to explore student creativity through task-based guided discovery learning to eliminate students' mathematical difficulties on high-line, line-sharing, and triangular outline materials. Benefits obtained can motivate students to continue to be creative in finding a concept with skills in drawing and help teachers to understand the wishes of students who need guidance in particular moments.

2. METHOD

The research begins with a survey of the school, compiling observation sheets and interview guides based on tasks, trials on research subjects, analysis of research data, inferences of research data (Rahmi et al., 2018). The type of research used is qualitative research—the study conducted in August until September 2017 at junior high school 16, 14, and 26. The objective was to describe student activities based on the creativity component and guided discovery steps in depicting the

high line, line dividing, and triangular outline. The instrument used in the research is the observation sheet of student activities. The technique of collecting data using observation technique. While the method of data analysis using data analysis of student activity observation using the formula as follows.

$$f = \frac{a}{b} \times 100\%$$

Notes: f = Percentage of activities often done
a = number of indicators that appear according to step guided discovery
b = total indicators according to guided discovery steps.

Table 1. Category of student's activity

No	% activity	Category
1	90 – 100	Very skilled
2	70 – 89	Skilled
3	50 – 69	quite skilled
4	0 – 49	Less skilled

Analysis of student's creativity observation data based on learning creativity component by using formula

$$g = \frac{c}{d} \times 100\%$$

Note: g = Percentage of creativity often done
c = number of creative components that appear
d = total creative component

As checking the validity data conducted interviews with students about activities to finish the task about the material.

Table 2. Category of students creativity

No	% creatifity	Category
1	91 – 100	Very creative
2	75 – 90	creative
3	60 – 74	Creative enough
4	0 – 59	Less creative

3. RESULTS AND DISCUSSION

The results showed that most of the student activity following the indicator in step guided discovery as follows. (1) students are stimulated by showing that they are looking at the picture and reading the questions in the task. (2) The student identifies problems by mentioning the characteristics of the triangle, and mentioning the element that must meet is the length of the sides and the angle. (3) The student uses a ruler to calculate the side length of the triangle, determining the midpoint of the side of the triangle. Students also use an arc to calculate the angle within the triangle and determine the right angle. The student uses the term to define the line in the triangle by making a circle that intersects the side of the triangle, making two more circles from the intersection. (4) The student describes circular arc cuts triangles sides and an arc that does not

intersect the sides of a triangle. (5) The student draws a line, which is the intersection of two circles vertices of the triangle with the run. The lines formed derived from the vertex intersection of the circular arc side wedge and in front of the triangle. (6) students can explain the characteristics of the lines that lie in the triangle from start to finish drawing.

Figure 1. the process of collecting data 1

Figure 1 shows that researchers give assignments in the form of triangular figures and ask students to answer questions to complete work. They use drawing aids such as ruler and term. Students answer all questions by drawing and writing on assignments.

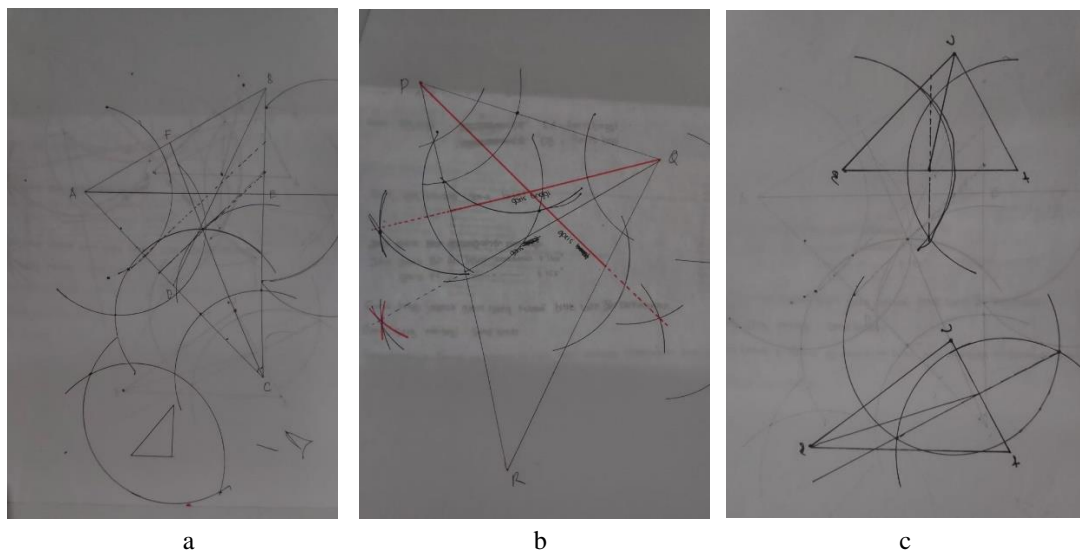a   b   c

Figure2. result of (a) the height lines, (b) the divided lines, and (3) the weight lines in a triangle

Figure 2 shows the results of drawing high lines, bisecting lines, and bisecting lines using the term. Students draw top lines by connecting vertices with points on the sides in front of them that form right angles. They bring a bisector by using the run at the vertex, cutting both sides of the triangle. Furthermore, from each point of intersection, the hands of the triangle are made using a circle so that each intersects one point. The bisector is connecting the vertex and the intersection of the sphere. They draw a heavy line by trapping each vertex in a circle. Then, the junction of

each side of the triangle is connecting a straight line. The intersection of the straight lines produces the midpoint of the bottom of the triangle. Students draw a heavy line by connecting the vertex with the midpoint of the bottom of the triangle.
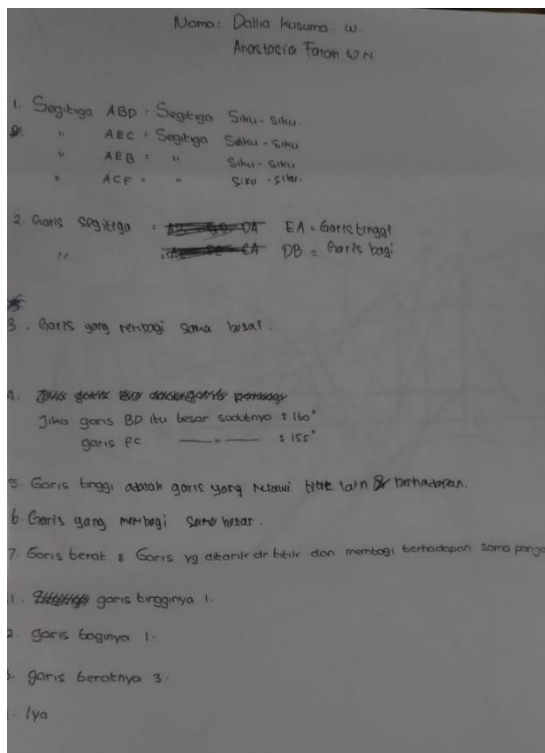

Figure 3. students assignment results in 2

Figure 3 shows that these results indicate that students write about the triangle categories and line characteristics in a triangle. Students answer based on drawings using a ruler and a term stating the lines in a triangle. They also named triangles with vertices using capital letters.

Table 3. Result of guided discovery based task

No	Steps	Results
1	Stimulation	Students observe triangular images and read questions
2	Problem statement	Students mention the elements in the triangle, side length, and the size of the measured angle
3	Data collection	Students measure the length of the side, measure the angle, determine the right corner, ask about the circular arc drawn from the point of cutting one side or two sides or sides in front of the vertex.
4	Data processing	Students inquired about the artificial creation of a circle arbitrarily defined. He is depicting a circular arc on both sides flanking the angle, then drawing a circular arc on the hand in front of the corner. Next, he drawing a circular arc intersecting from both vertices, determining the right angle of the arc intersection with the front side of the hole. He illustrates two arcs of circles from the intersection of the arc with the hands of a triangle.

They are skilled in using the arc and the drawing compass in depicting the height lines, the dividing line, the weight lines in the triangle. The data analysis shows that according to the

observation result is 80%, including the skilled category, and 85% are creative. From the results of checking the validity of data, creativity indicated that smoothness, flexibility, originality, and use elaboration in understanding and explain the concept of the line in the triangle. Tasks related to images are also easily solved with their drawing skills using a combination of ruler, arc, and run. After drawing, they can explain the steps according to guided discovery so that they can describe the characteristics of the height lines, the dividing line, the weight lines in the triangle.

During the study, there were findings that some students still needed help from colleagues and researchers to determine the line in the triangle despite the known elements to be met. They need help long enough so that the speed of each student in learning the range is different. Follows the findings of previous research, which also states that the rate in the process of adaptation Piaget is the process of assimilation and accommodation also varies. Students with low ability tend to be slow in adapting despite the help of researchers. Conformity with existing theory also applies in this case guided discovery takes a long time because students directed to be able to find their concept with guidance.

4. CONCLUSION

From the results of research and findings, it could conclude that guided discovery task-based learning can raise the creativity of students about the concept of lines in the triangle. Students are creative, demonstrated with fluency in understanding the assigned task, using aids in the drawing; flexibility in determining the elements that must exist to accomplish the work, the originality in describing the characteristics of the line in the triangle, and using elaboration in explaining the features of the line in the triangle.

This research hopes to contribute to the education of mathematics, especially in guiding the creation of low-ability students who quickly dropped their motivation in learning. Difficulty learning math can eliminate if the teacher understands and guide students to be able to find the concept with its sentence. This action will trigger students' creativity in learning. Suggestions that can deliver are the need for teachers to keep guiding students even though students are less likely to ask questions. Lessons other than guided discovery can also apply that are also tailor to the characteristics of the students. Students who use the tools in calculating or drawing with a ruler, bow, and run can still use it in learning if it is difficult to understand the concept described by the teacher. The need for discussion with peers is also necessary to motivate students from feeling less confident and quickly give up.

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