Research Article https://doi.org/10.12973/eu-jer.11.1.117

European Journal of Educational Research
Volume 11, Issue 1, 117 - 126.
ISSN: 2165-8714
https://www.eu-jer.com/

Activist Learners' Creative Thinking Processes in Posing and Solving Geometry Problem

Rosita Dwi Ferdiani
Universitas Negeri Surabaya/ Universitas PGRI Kanjuruhan Malang, INDONESIA

Manuharawati*
Universitas Negeri Surabaya, INDONESIA

Siti Khabibah
Universitas Negeri Surabaya, INDONESIA

Received: July 26, 2021 ▪ Revised: September 23, 2021 ▪ Accepted: November 16, 2022

Abstract: This study aimed to describe the creative thinking process of students with active learning styles in proposing and solving problems on geometry material. The research instruments were Honey and Mumford's Learning Style Questionnaire (LSQ), problem-solving and submission test sheets, and interview guidelines. The LSQ questionnaire was distributed to students majoring in mathematics education at a university in Malang, Indonesia, with a total of 200 students. Students who have an active learning style and meet the specified criteria will be selected as research subjects. Based on research on creative thinking processes in proposing and solving problems in students with active learning styles, it was found that there were differences in behaviour between subject 1 and subject 2 at each stage of creative thinking. However, based on the researcher's observations of the behaviour of the two subjects at each stage of their thinking, there are similarities in behaviour, namely, they tend to be in a hurry to do something, prefer trial and error, and get ideas based on daily experience.

Keywords: *Creative thinking process, geometry, posing and solving problems.*

To cite this article: Ferdiani, R.D, Manuharawati, & Khabibah, S. (2022). Activist learners' creative thinking processes in posing and solving geometry problem. *European Journal of Educational Research, 11*(1), 117-126. https://doi.org/10.12973/eu-jer.11.1.117

Introduction

Creative thinking skills are needed in facing future challenges (Trilling & Fadel, 2009). Individual success is strongly influenced by his creative abilities (Sternberg, 2003). Because success in dealing with problems begins with creative thinking (Susilo et al., 2018). Creative thinking is a process of thinking that is original and reflective and produces complex products, including synthesizing ideas, generating new ideas, and determining their effectiveness, as well as the ability to make decisions. Creative thinking is usually associated with generating new solutions in dealing with problems (Arends & Kilcher, 2010). When associated with the creative thinking process, it can be interpreted as a stage or process that combines logical thinking and divergent thinking in solving problems.

Several researchers have developed theories related to creative thinking processes (Guilford, 1967; Lubart, 2001, 2005; Siswono, 2016; Sternberg, 2003; Walton & Kemmelmeier, 2012). If previous research has a tendency to use the Wallas stage to find out the stages of the creative thinking process, in this study, the researcher uses the stages of the creative thinking process developed by (Siswono, 2016). This is because at this stage the characteristics of each stage of creative thinking can be known through the process of 1) synthesizing ideas, namely weaving or combining the ideas they have. 2) Building ideas, namely bringing up ideas related to the given problem as a result of the previous idea synthesis process. At this stage the novelty, fluency and flexibility of individuals will be seen in solving problems. 3) Planning the implementation of ideas, namely choosing a certain idea to be used in solving a given problem or to be solved. 4) Implementing ideas, namely implementing or using planned ideas to solve problems.

Problem solving in mathematics requires creative thinking. Problem solving is one type of intellectual creativity (Gagné, 1985) Several researchers have shown a relationship between creative thinking and problem solving (Demir Barutcu, 2017; Hasret & Savaş, 2019; Leung, 1997) The elaboration stage, which is one aspect of creative thinking, is a key factor that stimulates a person to develop their knowledge in problem solving activities. Meanwhile, the relationship between problem-posing and creative thinking has been stated by several researchers. Problem-posing can improve students' creative thinking, especially in the aspect of flexibility and posing mathematical problems can improve creative thinking, especially in the fluency aspect (Silver, 1997). This study will focus more on the creative

* **Corresponding author:**
Manuharawati, Universitas Negeri Surabaya, Surabaya, Indonesia. ✉ manuharawati@unesa.ac.id

thinking process in posing and solving geometric problems. The ability to propose and solve geometric problems is influenced by learning styles (Aljaberi, 2015). This is because the learning style is a characteristic that a person has in solving a problem. Teachers can use students learning styles to improve learning by building opportunities and student experiences (Massey et al., 2011), so as to create effective learning. Classroom learning can be adapted to student learning styles so that it can improve students' academic scores (Komarraju et al., 2011; Tyndall, 2017). Several theories about learning styles have been developed by several experts (Gagné, 1985; Honey & Mumford, 2006). But in this study, the learning style that will be used is the learning style according to the theory of Honey and Mumford (2006). Because this learning style can be applied at all levels of education even in universities and this theory already has an instrument in the form of a Learning Styles Questionnaire (LSQ) questionnaire that can be used to detect student learning styles in college (Duff & Duffy, 2002). LSQ has been tested for validity and has been used in several countries (Aziz et al., 2013; Chan & Mak, 2010; Kappe et al., 2009; Maric et al., 2015; Sadler-Smith, 2001). The theory of learning styles according to Honey and Mumford divides learning styles into four types, namely activist, reflector, theoretical, and pragmatic. In contrast to previous studies, this study will examine the learning styles of activism-type students, prospective mathematics teachers. This is because the tendency of students to have this type of learning style is very small, because this learning style is owned by individuals who are active in activities that demand to keep up with the times. Someone with an active learning style learns something through a trial and error process, so they tend to produce original products. They are flexible, open and enthusiastic about trying new things (Honey & Mumford, 2006). That is, if the indicators of creative thinking, then the characteristics of the active learning style have a relationship with the indicators of creative thinking fluent, flexible, original. If it is associated with learning mathematics, especially in geometry material, the character of activists who like the trial and error process is needed to solve problems, especially in geometry material. The existence of this relationship is the reason why researchers choose an active learning style in developing and solving problems related to geometry.

Several researchers have investigated problem solving in geometry, including (Amari, 2016; Sukmawati & Salsabila, 2018; Utami et al., 2019). Geometry is one of the basic concepts that must be mastered by students. Geometry can help students develop visualization, spatial, critical thinking skills, intuition, perspective, problem solving, conjecture, deductive reasoning, and logical argument (Anjarsari, 2019). However, in this study, the focus is on posing and solving geometric problems, especially on the surface area and volume of flat-sided shapes.

Methodology

This research is a qualitative research that aims to describe the creative thinking process of students with active learning style in posing and solving problems in Geometry material. While the type of this research is a case study, where an in-depth longitudinal examination is carried out on the creative thinking process of students with active learning styles in proposing and solving problems based on learning styles by using systematic ways of observing, collecting data, analyzing information, and reporting the results. . The creative thinking process of students with this active learning style goes through the stages of synthesizing ideas, building ideas, planning the implementation of ideas, and implementing ideas. The subjects of this study were students of the Mathematics education study program at one of the universities in the city of Malang, amounting to 200 people. Subject selection was carried out by distributing LSQ prospective research subjects. The choice of research subjects was based on Honey and Mumford's LSQ questionnaire analysis. Based on the results of the questionnaire analysis, will know the learning style of each research subject After analyzing the results of the Learning Style Questionnaire (LSQ) into learning style groups, the next step is to select prospective research subjects based on predetermined criteria. The criteria that have been set are: a) Have activist learning style, b) Age in the range of 18-25 years, c) Have the same gender, d) Have attended the School Mathematics Development Study (KPMS) course, e) Have good abilities relatively the same. This relatively equivalent ability was chosen based on the Grade Point Average (GPA) with a range of 3.40 – 3.45. Prospective subjects who meet all of these criteria, will later be used as research subjects. The main instrument in this study is the researcher who is will be better assisted by auxiliary instruments in the form of:

a. Learning Styles Questionnaire (LSQ),

Honey and Mumford's LSQ contains statements to determine student learning styles. This questionnaire has been tested for reliability and validity by several researchers including: (Aziz et al., 2013; Chan & Mak, 2010; Kappe et al., 2009; Maric et al., 2015). In this research, the LSQ has been tested for validity and reliability of the questionnaire. The validity and reliability of the questionnaire are as follows.

Table 1. Reliability of the Learning Style Questionnaire

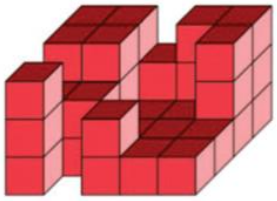
Model	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Learning Styles Questionnaire	0.696	0.619	0.081

Based on the figure, it can be seen that the validity and reliability of the questionnaire is 0.7 and is included in the high category. So, it can be concluded that the LSQ can be declared valid and reliable, so it can be used in research.

b. Test Questions

The test used in this study, in the form of a written test to determine the process of creative thinking in posing and solving problems, related to the material for the second semester of SMP, namely building a flat side space. The following is a test question which consists of 2 questions and refers to the stages of the creative thinking process.

Table 2. Test Questions for Posing and Solving Problem

Question Number 1	**Question Number 2**
Given a shape which is a combination of several shapes of flat side spaces. Based on this information, create several different questions and their solutions	Given a shape which is a combination of several flat-sided shapes, as in the picture below  Based on this information, create several different questions and their solutions.

c. Interview guidelines.

The interview guide used in this study is a development process that was adopted from indicators of creative thinking with learning styles. If it is associated with posing and solving problems, it can develop stages of creative thinking that are adjusted to indicators.

Participants

After the research instrument was declared valid and reliable as described in figure 1, the researcher distributed a questionnaire to students of the mathematics education study program at one university in Malang with a total of 200 students. The following are the results of the analysis of the distribution of the questionnaire carried out:

Table 3. Results of the Distribution of Learning Style Questionnaire (LSQ) Questionnaires

	Honey and Mumford type of learning style						
	Activist	**Pragmatic**	**Theorist**	**Reflector**	**(Reflector and Theorist)**	**(Pragmatic and Theorist)**	**(Pragmatic and (reflector)**
Total	12	24	34	55	28	24	23

Based on the table, it shows that there are more students with reflector learning styles than other types of learning styles. When compared with the results of the analysis at the time of testing the distribution of the previous questionnaire, it shows similarities. It can be concluded that most of the students (as many as 55 of 200 students), have a reflector type of learning style. The type of active learning style has the least amount when compared to other types of learning styles. Some students tend to have 2 types of learning styles, namely Reflector and Theorist (28 students), Pragmatic and Theorist (24 students) and Pragmatic and reflector (23 students).

After analyzing the results of the Learning Style Questionnaire (LSQ) into groups of learning styles, the next step is to select prospective research subjects based on predetermined criteria. The criteria that have been set are: a) Students with an active learning style, b) Ages ranging from 18-25 years, c) Having the same gender, d) Having taken the School Mathematics Development Study (KPMS) course, e) Having relatively similar abilities. These relatively equal abilities were selected based on the Grade Point Average (GPA) with a range of 3.40 – 3.45. Prospective subjects who meet all of these criteria, who will later be used as research subjects. The following is a list of prospective research subjects who meet the established criteria.

The results of the selection of prospective subjects based on these criteria obtained 9 candidates who met the criteria of 200 prospective research subjects. The following are the results of the selection of 9 candidates who meet the criteria.

Table 3. List of prospective research subjects based on learning styles and predetermined criteria

Prospective Research Subjects	Age	Gender	IPK	Grade of KPMS	Learning Styles
RDM	22	Female	3,45	Graduated	*Reflector*
LYM	21	Female	3,35	Graduated	*Reflector*
AM	22	Female	3,38	Graduated	*Reflector*
PHP	21	Female	3,39	Graduated	*Theorist*
CHAR	22	Female	3,42	Graduated	*Theorist*
ALA	22	Female	3,44	Graduated	*Pragmatic*
NR	23	Female	3,66	Graduated	*Pragmatic*
IP	22	Female	3,45	Graduated	*Activist*
RR	21	Female	3,49	Graduated	*Activist*

Because it has not met the expected criteria in selecting prospective research subjects, a re-election of prospective research subjects is held. Re-election of prospective research subjects was carried out by selecting 9 prospective research subjects with more specific criteria in terms of academic ability, namely having a GPA with a range of 3.40 to 3.45 and the same age (22 years). Based on the re-election of 9 prospective research subjects, 2 prospective research subjects were obtained with details as shown in Table 4 below

Table 4. List of Research Subjects

Research subject	Age	Gender	Grade of KPMS	IPK	Learning Style
IP	22	Female	A	3,45	Activist
CHAR	22	Female	A	3,42	Activist

Based on the results of the analysis of the distribution of the learning style questionnaire, it was found that only 2 students with active learning styles met the expected criteria. After obtaining the subject of an activist learning style, the subject was asked to take a test to determine the creative thinking process in posing and solving problems.

Findings / Results

The following are the results of the analysis of the creative thinking process in proposing and solving problems for the two subjects.

1) Subject 1

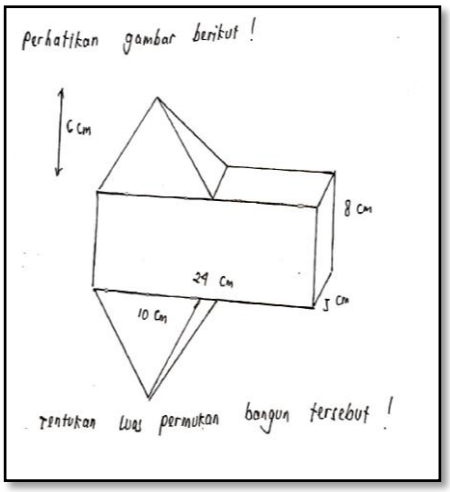


Figure 1: Question Posed by Subject 1

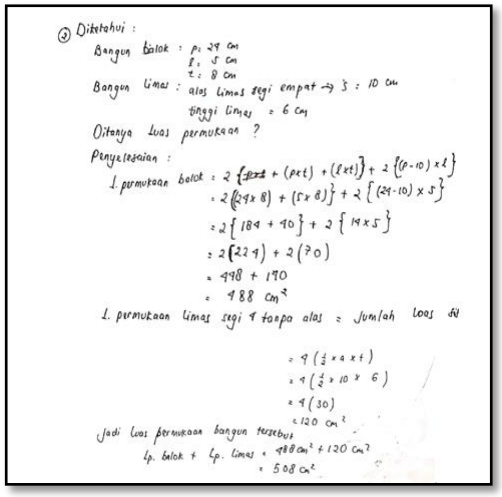


Figure 2: Problem Solved by Subject 1

Based on figure 2, subject 1 can be seen that subject 1 asked a question related to the combination of building blocks consisting of two pyramids and blocks. Then subject 1 asked to determine the surface area of the combined shapes. Based on Figure 2, the subject solves the problem based on the question posed. Subject 1 calculates the surface area of the block and the surface area of a rectangular pyramid without a base. Then calculate the combined surface area of the pyramid and the block. Subject 1 solved the problem posed correctly.

Subject 1 poses questions related to fraction and comparison operations. Based on the questions posed, subject 1 solved the problem correctly. Based on the researcher interview with subject 1, it was found that subject 1 asked questions based on the daily problems faced, and the problem was packaged in-story questions. When solving the

question posed, subject 1 remembers the material that has been received when attending the School Mathematics Development Study course. Based on the results of the interview, subject 1 had no difficulty in answering the test questions. Based on the exposure to the stages of the creative thinking process of subject 1 in proposing and solving problems, it can be concluded in table 4 below.

Table 4. Analysis of the Creative Thinking Process Subject 1 in Posing and Solving Problems

No	Creative Thinking Stage	Activist Learning Style Subject Data (S1)
Posing Problem		
1.	Synthesizing Ideas	a. Bringing up ideas related to building a flat side room. b. Get sources of ideas based on everyday experiences.
2.	Building ideas	a. Illustrate his idea through pictures of building houses that he encounters in his daily life. b. Look for the formula for building a space by drawing a shape according to the idea.
3.	Planning the implementation of the idea	a. Choose an idea to ask a question, but it doesn't match the first idea (at the idea building stage). b. Difficulty in asking questions, especially story problems.
4.	Implementing the idea	a. Although without difficulty in compiling the questions posed, but less varied in compiling the questions in the questions posed. b. Can ask questions that meet the aspects of recency and flexibility, but do not meet the aspects of fluency.
Solving Problem		
1.	Synthesizing Ideas	a. Determine the formulas needed to solve the problems posed. b. The idea is based on the formulas for the surface area of pyramids and blocks, as well as Pythagoras. c. Sources of ideas based on knowledge received in learning in previous courses.
2.	Building ideas	a. Determine the steps to solve the problem posed. b. Look for the formulas needed by looking for drawing nets, pyramids and blocks.
3.	Planning the implementation of the idea	a. Reduce variation in solving the problems posed because it can only determine one way of solving. b. Solve questions posed quickly and without any difficulties.
4.	Implementing the idea	a. Can solve problems without any difficulty, but make a mistake in calculating the height of the perpendicular side of the pyramid. b. Feel challenged in solving the problems posed, but less thorough in solving problems because they are always in a hurry.

Based on the creative thinking process of subject 1 with an active learning style in proposing and solving problems in questions number 1 and 2, it can be concluded that:

a) Subject 1 has a character that tends to always be in a hurry either in reading questions or working on questions. This causes inconsistency of ideas at the idea-building stage with the planning and implementing stages of the idea.
b) Subject 1 likes challenges and tends to like learning that comes from everyday experiences.
c) Subject 1 tends to illustrate his idea by drawing based on his idea.
d) When posing the problem in question number 1, subject 1 is less varied in formulating questions in the matter.
e) At the time of posing the problem in question number 1, subject 1 was able to meet the aspects of recency, flexibility but did not meet the aspects of fluency.
f) When solving the problem in question number 1, subject 1 can only meet the flexibility aspect, but has not met the novelty and fluency aspects.
g) Subject 1 found it difficult to work on question number 2, due to the availability of spatial images in question number 2. This limited the idea of subject 1 in asking questions, and was less productive in generating ideas.
h) When asking questions in question number 2, you can ask different questions, but they are less varied in determining the questions.
i) When solving the problem in problem number 2, you can only determine one way of solving it.
j) When solving the problem in question number 2, subject 1 experienced an error in determining the formula for the arithmetic series.
k) At the time of posing the problem in question number 2, subject 1 was able to meet the aspects of recency, flexibility but did not meet the aspects of fluency.

2. Subject 2

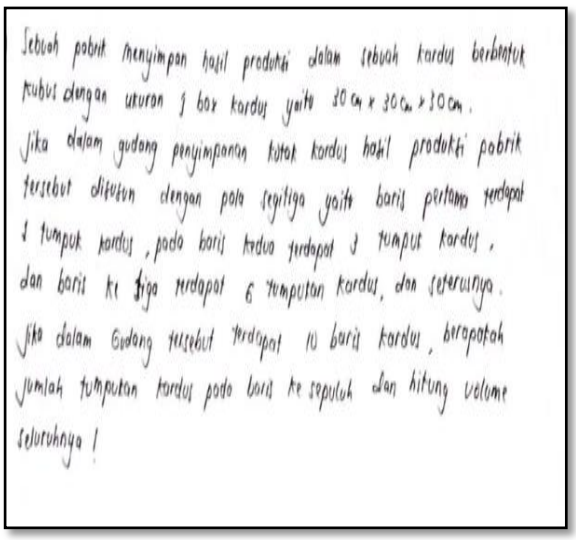


Figure. 3

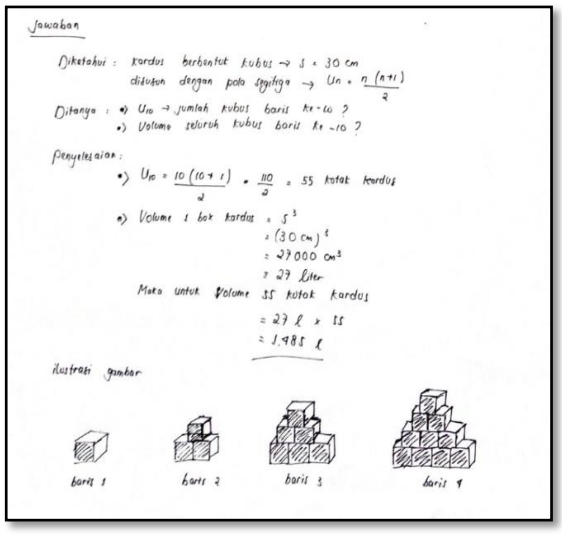


Figure. 4

Question Posed by Subject 2 Problem Solved by Subject 2

Based on Figure 4, subject 2 poses a question related to the volume of the cube. Subject 2 asked a story that tells of a factory storing its products in a cube-shaped cardboard with a size of 30 cm x 30 cm x 30 cm. If the building stores cardboard produced by the factory, it is arranged in a row pattern, namely in the first row there is 1 pile of cardboard, in the second row there are 3 piles of cardboard and the third row there are 6 piles of cardboard and so on. The question in the problem is if there are 10 rows of cardboard in the building, how many piles of cardboard are in the tenth row and calculate the volume?

Based on Figure 5, subject 2 solves the problem posed. Subject 2 had an error in determining the arithmetic series formula, so subject 2 could not determine the number of the 10th sequence, because he could not remember the arithmetic series formula. The following is an analysis of the creative thinking process of subject 2 in posing and solving problems.

Based on the exposure to the stages of the creative thinking process of subject 2 in posing and solving problems, it can be concluded in table 5 below.

Table 5. Analysis of the Creative Thinking Process Subject 2 in Posing and Solving Problems

No	Creative Thinking Stage	Activist Learning Style Subject Data (S2)
Posing Problem		
1.	Synthesizing ideas	a. Ideas based on pictures of cube shapes, cube formulas, and number patterns b. Difficulty in generating ideas based on pictures on the problem. c. The source of these ideas is obtained based on daily experiences and learning experiences when attending Basic Mathematics lectures
2.	Building ideas	a. Determine the idea to pose a question, which is in the form of 39 cube-shaped boxes. b. Less productive to come up with ideas.
3.	Planning the implementation of the idea	a. Can illustrate ideas for asking questions by drawing a line pattern. b. Less able to develop the questions to be asked, because of the difficulty in developing questions in other ways.
4.	Implementing the idea	No difficulty in compiling the questions posed. Even though they can arrange different questions, they are less varied in determining the questions in the questions.

Table 5. Continued

No	Creative Thinking Stage	Activist Learning Style Subject Data (S2)
Solving Problem		
1.	Synthesizing Ideas	a. Can determine the concepts and formulas needed to solve the problems posed b. The idea comes from the cube formula, numbers and number patterns. c. The source of ideas is based on the learning experience in Basic Mathematics class.
2.	Building ideas	a. Find the cube formula by drawing nets - cube nets b. Having trouble finding the formula for a series of sequences. c. Having errors in understanding the concepts of sequences and series.
3.	Planning the implementation of the idea	a. Can determine the steps for solving the problems that have been proposed. b. Less able to develop other ways to solve problems, because they can only find one way of solving them.
4.	Implementing the idea	a. Having difficulty, especially in determining the number of the 10th sequence, because they cannot remember the arithmetic series formula. b. Experienced an error in solving the problem posed because of an error in determining the arithmetic series formula.

Based on the creative thinking process of subject 2 with an active learning style in proposing and solving problems in questions number 1 and 2, it can be concluded that:

a) Subject 2 likes challenges and tends to like learning that comes from everyday experiences.
b) Subject 2 found it difficult to work on question number 2, due to the availability of spatial images in question number 2. This limited the idea of subject 1 in asking questions, and was less productive in generating ideas.
c) When posing problem in question number 2, you can ask different questions, but they are less varied in determining the questions.
d) When solving the problem in problem number 2, subject 2 can only determine one way of solving it.
e) When solving the problem in question number 2, subject 2 experienced an error in determining the formula for the arithmetic series.
f) At the time of posing the problem in question number 2, subject 2 was able to meet the aspects of recency, flexibility but did not meet the aspects of fluency.
g) When solving the problem in question number 2, subject 2 can only meet the flexibility aspect, but has not met the novelty and fluency aspects.

Discussion

Based on research by (Nielsen & Kreiner, 2017), it is found that each individual has a different learning style. This affects the way they get information or solve the problems they face. The way a person solves problems is influenced by his creative thinking. Several researchers have shown a relationship between creative thinking and problem solving (Demir Barutcu, 2017; Hashimoto, 1997; Hasret & Savaş, 2019; Leung, 1997; Puspitasari et al., 2018; Samani et al., 2019). And, when it comes to learning styles, several researchers have conducted research related to the relationship between learning styles and creative thinking, namely (Eishani et al., 2014; Friedel & Rudd, 2006; Kassim, 2013).

The difference between this study and previous research, in this study, examines the creative thinking process of students with active learning style in proposing and solving problems in geometry material. The results showed that someone with an activist thinking style tends to act first without considering the consequences afterwards, likes challenges and new experiences, and learns through trial and error. This is in accordance with research (Yousef, 2016) which states that Activists learn by trial and error. They are open-minded and enthusiastic about trying new things. If it is associated with creative thinking indicators, then the characteristics with the active learning style have links with creative thinking indicators, namely fluent, flexible, original. The characteristics of the active learning style can be seen in the creative thinking process, where at the stage of synthesizing ideas in asking questions, the research subject reads the questions in a hurry. And to get the answers to the questions, the research subjects tried to draw some geometric figures, such as blocks, cubes and pyramids. Through this spatial image, the research subject builds an idea, so that based on the spatial image idea, the research subject can apply his idea in asking questions. Meanwhile, to solve the problem, the research subjects tried to make nets of blocks and pyramids and wrote the formulas for the surface area and volume of the blocks and pyramids. Based on these nets, the research subjects can solve the problems posed.

Conclusion

Based on research on creative thinking processes in proposing and solving problems for students with active learning styles, there are differences between subject 1 and subject 2 in each stage of creative thinking. At the idea synthesis stage in posing a problem, the subjects (S1) and (S2) began their activities by reading the questions in a hurry. The

hasty character tends to be the hallmark of this subject. At the idea synthesis stage in solving problems, subjects (S1) and (S2) can find ways to solve problems and determine the concepts that will be used to solve the problems posed. At the stage of building ideas, building ideas, the subject begins to carry out experimental drawing activities according to the illustration of ideas at the synthesis stage. The images produced by this subject are objects that are often encountered in everyday experience. At this stage, aspects of recency, fluency and flexibility are seen. At the stage of planning the application of ideas, the subject can determine the concept to solve the problem posed. At the stage of applying the idea, the subject can solve the problem posed. But based on the researcher's observations of the behavior of the two subjects at each stage of their thinking, there are similarities in behavior, namely they tend to be in a hurry to do something, prefer trial and error, and get ideas based on daily experience.

Recommendations

This research is specifically for future mathematics teacher candidates. Because teachers have an important role in improving students' creative thinking skills. Teachers must be creative thinkers in posing and solving problems. But it is necessary to study and research about the thought processes of prospective teacher students in proposing and solving problems based on their learning styles. This is necessary because every student has a different learning style. This difference in learning styles causes differences in the formation and understanding of information. Researchers consider it necessary to know the picture of thinking made by prospective teacher students in asking questions and solving problems. because basically student teacher candidates who will become teachers must make questions properly in order to improve the creative thinking skills of their students.

For this reason, it is necessary to conduct further research on the creative thinking process of students with reflector, theorist, and pragmatist learning styles and how to improve creative thinking skills based on learning styles.

Limitations

This study only discusses students who have an active learning style. This is done in order to get a clear picture of the creative thinking process of students who have an active learning style in proposing and solving problems in geometry material. For this reason, further research is needed on the creative thinking process of students with learning styles other than activists.

Authorship Contribution Statement

Ferdiani: Conceptualization, design, analysis, writing. Manuharawati: Editing/reviewing, securing funding, supervision. Khabibah: Editing/reviewing, critical revision of the manuscript, supervision.

References

Aljaberi, N. M. (2015). University students' learning styles and their ability to solve mathematical problems. *International Journal of Business and Social Science, 6*(4-1), 152-165. https://bit.ly/3biN7fz

Amari, S. (2016). *Information geometry and its applications*. Springer. https://doi.org/10.1007/978-4-431-55978-8

Anjarsari, E. (2019). Mengembangkan kemampuan spasial siswa melalui pendekatan saintifik dalam pembelajaran matematika [Developing students' spatial abilities through a scientific approach in learning mathematics]. *Reforma Journal/ Jurnal Reforma, 7*(2), 55 - 61. https://doi.org/10.30736/rfma.v7i2.77

Arends, R., & Kilcher, A. (2010). *Teaching for student learning: Becoming an accomplished teacher*. Routledge. https://doi.org/10.4324/9780203866771

Aziz, Z., Yi, T. X., Alwia, S., & Jet, C. N. (2013). Learning style preferences of pharmacy students. *The European Journal of Social & Behavioural Sciences*, *4*(1), 119–129. https://doi.org/10.15405/ejsbs.2013.1.14

Chan, S. C. H., & Mak, W. (2010). The use of Learning Styles Questionnaire in Macao. *Industrial and Commercial Training*, *42*(1), 41–46. https://doi.org/10.1108/00197851011013706

Demir Barutcu, C. (2017). The relationship between problem solving and creative thinking skills among nursing students. *International Journal of Psychology and Educational Studies*, *4*(2), 34–41. https://doi.org/10.17220/ijpes.2017.02.004

Duff, A., & Duffy, T. (2002). Psychometric properties of Honey & Mumford's Learning Styles Questionnaire (LSQ). *Personality and Individual Differences*, *33*(1), 147–163. https://doi.org/10.1016/S0191-8869(01)00141-6

Eishani, K. A., Saa'd, E. A., & Nami, Y. (2014). The relationship between learning styles and creativity. *Procedia - Social and Behavioral Sciences*, *114*, 52–55. https://doi.org/10.1016/j.sbspro.2013.12.655

Friedel, C. R., & Rudd, R. D. (2006). Creative thinking and learning styles in undergraduate agriculture students. *Journal of Agricultural Education*, *47*(4), 102–111. https://doi.org/10.5032/jae.2006.04102

Gagné, R. M. (1985). *The conditions of learning and theory of instruction*. Holt, Rinehart and Winston, Holt-Saunders.

Guilford, J. P. (1967). *The nature of human intelligence*. McGraw-Hill.

Hashimoto, Y. (1997). The methods of fostering creativity through mathematical problem solving. *ZDM - Mathematics Education*, *29*(3), 86–87. https://doi.org/10.1007/s11858-997-0005-8

Hasret, N., & Savaş, A. (2019). Analysis of the relation between creativity level and problem solving skills of gifted and talented students. *Educational Research and Reviews*, *14*(15), 518–532. https://doi.org/10.5897/ERR2019.3790

Honey, P., & Mumford, A. (2006). *The learning styles helper's guide*. Peter Honey Publications Ltd.

Kappe, F. R., Boekholt, L., den Rooyen, C., & Van der Flier, H. (2009). A predictive validity study of the Learning Style Questionnaire (LSQ) using multiple, specific learning criteria. *Learning and Individual Differences*, *19*(4), 464–467. https://doi.org/10.1016/j.lindif.2009.04.001

Kassim, H. (2013). The relationship between learning styles, creative thinking performance and multimedia learning materials. *Procedia - Social and Behavioral Sciences*, *97*, 229–237. https://doi.org/10.1016/j.sbspro.2013.10.227

Komarraju, M., Karau, S. J., Schmeck, R. R., & Avdic, A. (2011). The big five personality traits, learning styles, and academic achievement. *Personality and Individual Differences*, *51*(4), 472–477. https://doi.org/10.1016/j.paid.2011.04.019

Leung, S. S. (1997). On the role of creative thinking in problem posing. *ZDM - Mathematics Education, 29*(3), 81–85. https://doi.org/10.1007/s11858-997-0004-9

Lubart, T. (2005). How can computers be partners in the creative process: Classification and commentary on the Special Issue. *International Journal of Human-Computer Studies*, *63*(4–5), 365–369. https://doi.org/10.1016/j.ijhcs.2005.04.002

Lubart, T. I. (2001). Models of the creative process: Past, present and future. *Creativity Research Journal*, *13*(3–4), 295–308. https://doi.org/10.1207/S15326934CRJ1334_07

Maric, M., Penger, S., Todorovic, I., Djurica, N., & Pintar, R. (2015). Differences in learning styles: A comparison of Slovenian universities. *Procedia - Social and Behavioral Sciences*, *197*, 175–183. https://doi.org/10.1016/j.sbspro.2015.07.079

Massey, M. G., Kim, S.-H., & Mitchell, C. (2011). A study of the learning styles of undergraduate social work students. *Journal of Evidence-Based Social Work*, *8*(3), 294–303. https://doi.org/10.1080/15433714.2011.557977

Nielsen, T., & Kreiner, S. (2017). Course evaluation for the purpose of development: What can learning styles contribute? *Studies in Educational Evaluation*, *54*, 58–70. https://doi.org/10.1016/j.stueduc.2016.10.004

Puspitasari, L., In'am, A., & Syaifuddin, M. (2018). Analysis of students' creative thinking in solving arithmetic problems. *International Electronic Journal of Mathematics Education*, *14*(1), 49-60. https://doi.org/10.12973/iejme/3962

Sadler-Smith, E. (2001). Does the learning styles questionnaire measure style or process? A reply to Swailes and Senior (1999). *International Journal of Selection and Assessment*, *9*(3), 207–214. https://doi.org/10.1111/1468-2389.00173

Samani, M., Sunwinarti, S., Putra, B. A. W., Rahmadian, R., & Rohman, J. N. (2019). Learning strategy to develop critical thinking, creativity, and problem-solving skills for vocational school students. *Journal of Technology and Vocational Education/ Jurnal Pendidikan Teknologi Dan Kejuruan, 25*(1), 36–42. https://doi.org/10.21831/jptk.v25i1.22574

Silver, E. A. (1997). Fostering creativity through instruction rich in mathematical problem solving and problem posing. *ZDM - Mathematics Education*, *29*(3), 75–80. https://doi.org/10.1007/s11858-997-0003-x

Siswono, T. (2016). Proses berpikir kreatif siswa dalam memecahkan dan mengajukan masalah matematika [Students' creative thinking process in solving and proposing mathematical problems]. *Journal of Educational/ Jurnal Ilmu Pendidikan,15*(1), 60-68. http://journal.um.ac.id/index.php/jip/article/view/13/332

Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized*. Cambridge University Press. https://doi.org/10.1017/CBO9780511509612

Sukmawati, R. A., & Salsabila, S. (2018). Kemampuan pemecahan masalah geometri siswa SMP Negeri di Kecamatan Banjarmasin Utara tahun pelajaran 2016/2017 [Geometry problem solving ability of public junior high school students in the North Banjarmasin sub-district for the 2016/2017 academic year]. *EDU-MAT: Journal of Mathematics Education/ EDU-MAT: Jurnal Pendidikan Matematika, 5*(2), 127-136. https://doi.org/10.20527/edumat.v5i2.4632

Susilo, D. A., Ferdiani, R. D., & Murniasih, T. R. (2018). Peningkatan berpikir kreatif mahasiswa melalui model project based learning pada mata kuliah media manipulatif [Improving students' creative thinking through project based

learning models in manipulative media courses]. *Journal of Mathematics Education/ Jurnal Pendidikan Matematika, 5*(2), 62 -76. https://doi.org/10.18592/jpm.v5i2.1550

Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. Jossey-Bass.

Tyndall, D. M. (2017). Bridging the gap: Aligning teaching and learning styles. *Community College Journal of Research and Practice*, *41*(2), 139–142. https://doi.org/10.1080/10668926.2016.1197865

Utami, S., Usodo, B., & Pramudya, I. (2019). Level of students' creative thinking in solid geometry. *Journal of Physics: Conference Series*, *1227*, 012023. https://doi.org/10.1088/1742-6596/1227/1/012023

Walton, A. P., & Kemmelmeier, M. (2012). Creativity in its social context: The interplay of organizational norms, situational threat, and gender. *Creativity Research Journal*, *24*(2–3), 208–219. https://doi.org/10.1080/10400419.2012.677345

Yousef, D. A. (2016). The use of the Learning Styles Questionnaire (LSQ) in the United Arab Emirates. *Quality Assurance in Education*, *24*(4), 490–506. https://doi.org/10.1108/QAE-03-2016-0010