Determining ways to improve critical thinking skills in the math mathematics in student style

Ela Ulfiana*, Mardiyana, and Triyanto
Postgraduate of Mathematics EducationSebelas Maret University, Surakarta, Indonesia

*Corresponding Author: Elaulfi2@gmail.com

Abstract: The problem faced by teachers in SMP Negeri 2 kebakkramat is the mastery of students in triangular material, especially in instilling concepts in a limited time in the learning process. Although the provision of material determines the completeness of learning, the reality of achieving the learning objectives is far from what is expected based on the KKM. It was conducted at Junior High School (SMP) Negeri 2 Kebakkramat in academic year 2017/2018 by using purposive sampling technique to select the participants. Hence, the selected research subjects were 2 students. The results of the study show that students' critical thinking skills are still relatively low. The way to improve students' critical thinking skills in solving mathematical problems in learning styles one of the strategies that teachers can do is student-centered learning and optimizing on each student's learning style.

1. Introduction
Education in the 21st century, the concept of the concept of education to develop a new curriculum based on lessons to go to gold lessons must arise in four 21st century learning characters known as 4C, namely critical thinking and problem solving, creativity and innovation, collaboration and communication [1]. The quality of education in Indonesia is still low, it is shown based on the 2015 PISA results, ranked 69th out of 76 countries, while TIMSS in 2015 Indonesia ranked 45th out of 50 countries [2]. Efforts to improve the quality of education by making students improve their critical thinking skills can maximize student involvement in understanding, harmony in the community and learning to achieve learning goals and teachers as facilitators [3]. The latest 2013 curriculum can be one of the ways to facilitate the improving students' abilities.

Mathematics is a discipline in the branch of science that has an important role in various disciplines in good schools at the School level, so that mathematical abilities are part of the goal of the education curriculum in Indonesia . According to Cockrof the reason for the need for mathematics learning, namely mathematics is always used in all aspects of life, all fields of study require appropriate mathematical skills, mathematics can improve the ability to think critically, logically, thoroughly, and mathematics can provide satisfaction with the efforts to solve challenging problems [4]. Students who have the ability to think critically mathematically can analyze problems, determine the right actions and can follow up the actions taken [5]. Learning style is one of the factors that influence students in understanding the material. Students have a primary learning style that can be used to strengthen the main learning style effectively [6]. This study focuses on the visual learning style, which prioritizes the sense of sight. According to Gilakjan Visual learners think in pictures and learn best in visual images. They depend on the instructor's or the facilitator's non-verbal questions such as body language to help with understanding [7].
Problems that occur in SMP Negeri 2 Kebakkramat where students are not used to working on non-routine questions and the role of the teacher to deliver the material but not interact with students. Triangular material is material that can use teaching aids so that it makes it easier for students to understand the material by maximizing students’ learning styles based on visual characteristics [8]. Considering how important it is to develop critical thinking skills in learning, a strategic solution is needed to improve students’ critical thinking skills by optimizing the ability to think critically about learning styles that are primarily visual.

Because of the importance of mathematical critical thinking skills in the learning process, researchers are interested in conducting research on how to overcome mathematical critical thinking skills, some other researchers have researched on increasing the importance of the influence of critical thinking skills on learning based on social interaction [9]. In addition, there are other studies that have researched on the analysis of mathematical critical thinking skills in social arithmetic methods [10]. While this research focuses students’ thinking skills based on visual learning styles.

2. Method

This research is classified as descriptive qualitative research, which aims to describe the characteristics of developed tests, as well as estimating and describing the ability to think critically mathematically based on visual learning styles. This study was conducted from March 7, 2018 until April 3, 2018. Subjects in this study were students of class VII of Junior High School State 2 Kebakkramat who were selected using purposive sampling. The instrument used to explore the critical thinking, thinking is a written test in the form of description followed by an interview and a visual learning style using a developed questionnaire. Interviews were conducted in the form of semi-structured interviews, where questions were developed through the interview process. This interview was conducted. The validity of the data used in this study was triangulation technique.

3. Result and Discussion

The first step taken by the researcher is to make and conduct a visual learning style questionnaire test to determine the student's subject. The subjects chosen were having the highest questionnaire score and having the ability to think critically mathematically in solving the description test questions. About visual learning styles with characteristics of seeing and reading. To facilitate visual learners, learning is better to teach with diagrams, graphs, pictures, animations, transparency, videos or information presentation tools [11]. The results of the visual learning style questionnaire test of students in SMP Negeri 2 Kebakkramat areas in table 1 below.

| No | Sempel | Questionnaire | Score |
|----|--------|---------------|-------|
| 1  | AA     | 59            |
| 2  | AB     | 57            |
| 3  | AC     | 41            |
| 4  | AD     | 39            |
| 5  | AE     | 55            |
| 6  | AF     | 55            |
| 7  | BC     | 62            |
| 8  | BD     | 41            |
| 9  | BE     | 48            |
| 10 | BF     | 54            |
| 11 | CD     | 47            |
| 12 | CE     | 62            |
| 13 | CF     | 59            |
| SUM| Score  | 679           |
After the questionnaire test, two students were chosen as subjects because they had the highest score of the visual learning style. The second step is that students are given a mathematical critical thinking ability test to determine the ability of students to identify problems, collect and compile the information needed. This can be seen from the results of work in Figure 1 as follows.

1. A piece of land in the form of an equilateral triangle with a leg length of 13m and the other side is 10m. If the plot of land is to be planted with grass at a cost of Rp 50,000.00/m², look for the height of the triangle and calculate the total cost incurred.

2. Determine the area of flat build below this!

![FIGURE 1. The Problem of Critical thinking Ability mathematical](image1)

In Figure 1 students can recognize the problem, collect and compile information needed to solve problems shown by students can write clearly. The next step is for students to be able to recognize unstated assumptions and values, and use the right and clear language, but it is not correct so the next step is incorrectly indicated by the 5m triangle height. This is in accordance with the statement of the students "students do not understand the base and the height of the triangle". In Figure 2 the student does not show the expression about the issue or issue being discussed. This is shown by students not writing down what was asked to be questioned and in accordance with the student's statement that "I was confused in making sentences and not biased so I just wrote the results like that".

In Figure 3 students do not write Recognize the problem, Collect and compile information needed to solve problems. But when interviewed "students can say which ones Recognize the problem, Collect and compile information needed to solve problems". Recognize unstated assumptions and values, and use the right and clear language is incorrect so that the next step is incorrectly indicated by the 13m triangle height. This is in accordance with the statement of the students "students do not understand the base and the height of the triangle". In Figure 3 students can draw about the issue or issue being discussed. This is consistent with the student's statement that "I am sure to make the settlement sentence based on the problem".
Figure 4 students do not write Recognize the problem, Collect and compile information needed to solve problems because they are not familiar. But when interviewed "students can say which ones Recognize the problem, Collect and compile information needed to solve problems". Recognize unstated assumptions and values, and use the right and clear language incorrectly so that the next resolution step is incorrectly indicated by taking the height and base of the triangle so that the final result is incorrect. This is also strengthened based on the students' statement that "I am confused about the picture and confused also determines which height and base the triangle". Likewise, in Figure 5 it is almost the same, the difference is that students can draw on the issue or issue being discussed. This is consistent with the student's statement that "I am sure to make the settlement sentence based on the problem".

Based on the results of students' answers, researchers concluded that students with visual learning styles can maximize the ability to think critically mathematically by means of learning design. This is consistent with previous research [12] that "creating learning that can maximize students' abilities so that the teacher must calculate the possibility of special student responses". It is also supported that the use of learning media in the learning process and bring psychological influence on students [13]. But each student has a way of understanding the material, in order to improve visual student learning it is better to use media in the form of props.

4. Conclusion
Based on the results of solving critical mathematical thinking problems conducted by students who have a visual learning style, it will be easier to capture and remember material by using media in the learning process. However, teachers must be more advanced in facilitating the right media for students. Therefore, the use of the median is one of the ways to be able to improve students' critical thinking skills by being given late and finding the formulas used in triangular material.

References
[1] Yomnoon S 2018 Education 4.4 Teaching And Learning In 21 Th Century Lobbury Thailand Thepsatri Rhajabat University
[2] Tajudin N M and Chinnapan M 2016 J. Internasional Instr. 9 pp 200-213
[3] Gorzycyki M 2007 Improving Student's Critical Thinking The Center For Teaching And Faculty Development vol 2 pp 1-10
[4] Pashler and Harold 2009 Learning Styles Concepts And Evidence Los Angeles : Association For Psychological Science vol 9 p 3
[5] Thompson C 2011 Int. J. Humanit. Soc. Sci. 1 pp 80-100
[6] Dening and Stephen J 2004 Multiple Intelligences And Learning Styles Columbia Univ: Teacher College Record vol 1 p 106.
[7] Gilakjani A P 2012 J. Stud. Educ. 2(1)
[8] Chang S H, Ku A C, and Yu L C In 2nd WIETE Annu. Conf. Eng. Technol. Educ. 1 pp 53-57
[9] Iakovos T 2011 Int. J. Humanit. Soc. Sci. 1 pp 84-85
[10] Rosen Y and Tager M 2013 Research Report: Evidence-Centered Concept Map As Thinking Tool in Critical Thinking Computer-Based Assessment (Baston: Pearson, 8 pp 89-112)
[11] TAljaberi N M 2015 Int. J. Bus. Soc. Sci. 6 pp 152-165
[12] Cotton K 1991 Teaching Thinky Skills Retrieved From Northwest Regional Educational Laboratory’s School Improvement Research Series vol 3 pp 27-37.
[13] Brousseau G 1997 Theory Of Didactical Situation in Mathematics Dordrecht: Kluwer Academic Publishers vol 2 pp 109-120