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Student's Creative Thinking Skills Viewed by Adversity Quotient and Mathematics Anxiety in Grade VIII

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Abstract

Creativity, math anxiety, and adversity quotient play a significant role in mathematics. This study aims to describe student's creative thinking skills viewed by adversity quotient and mathematics anxiety. This research is a descriptive qualitative approach. Subjects in this study were students of SMP N 9 Semarang, and students of SMP N 8 Semarang grade VIII who selected by adversity quotient and mathematics anxiety. Data was collecting by questionnaire, observation, test, and interview. The result showed that (1) creative thinking skills in climber students classified creative (able to satisfy fluency, flexibility, and novelty) and less creative (able to satisfy fluency, and flexibility), (2) creative thinking skills in camper students classified less creative, they were able to satisfy fluency, and flexibility , (3) creative thinking skills in quitter students classified not creative, they were only able to satisfy fluency.

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INTRODUCTION

In this globalization era which is increasingly modern and full of competitive, everyone is required to have high human resources, high science and technology and also good attitude. To obtain this, everyone needs education as a means of forming individual knowledge and personality. According to UU No. 20 tahun 2003, Education is a conscious and effort to create an atmosphere of learning process so that students can develop actively their potential skills to have spiritual quotient, self-control, personality, intelligence, character, and the skills needed by themselves, community, and country.

Entering the 21st century, the government improve the quality of education through various innovations, including in the education system, curriculum, textbooks, teaching methods, and improving the quality of teachers as instructors. This is considering the importance of education in producing quality, reliable and competent human resources in various fields, one of them is mathematics.

Mathematics is an organized structured science. It's because mathematics starts from elements that are not defined, then elements that are defined to the axioms or postulates and finally to the theorems. Mathematical concepts are arranged hierarchically, structured, logical, and systematic from the simplest concepts to the most complex concepts. Therefore, to study mathematics, the previous concepts that are prerequisites must be mastered in order to understand the next topic or concept. Mathematics as a branch of science can develop the attitude of creative thinking patterns which are goals in learning mathematics (Suherman et al., 2003; Hudojo, 2003).

Mathematics also a subject that has an important role in education because mathematics is the queen of all branches of science. Therefore mathematics were studied in every level of education with a greater proportion of time than other subjects. Studying mathematics certainly has a variety of purposes. The National Council of Teachers of Mathematics (NCTM) (2000) formulates the aims of learning mathematics called mathematical power including: (a) mathematical communication, (b) mathematical reasoning, (c) mathematical problem solving, (d) mathematical connection, (e) representation. Junaedi & Asikin (2012) explains that learning mathematics needs to be designed in such a way as to encourage students to have mathematical skills, such as understanding, communication, connection, reasoning, and mathematical problem solving.

In accordance with the 2013 Curriculum the mathematical competencies to be achieved namely critical thinking or problem solving, creativity, communication, and collaboration. These competencies are needed so that students can have the skills to obtain, process, and utilize information to deal with real life problems. To develop these skills, competency standards and basic mathematics competencies are developed as a basis for learning and develop the skills to use mathematics in problem solving and communicating ideas by using symbols, tables, diagrams and other media.

Slameto (2010) states that creativity is the result of learning in cognitive skills, so to be creative can be learned through the teaching and learning process. Creative is one of the abilities expected to arise from within students when dealing with a problem (Adhiwibowo, B. & Karyati, 2018). Mathematical creative thinking is also needed in making, interpreting and solving problems as well as mathematical communication which is very necessary in learning mathematics. Therefore we need a deep awareness of the teacher to always try

to provide an environment that allows creativity to emerge, foster it, and stimulate its growth (Noer, S.H, 2009)

A fact about the low level of creativity of children in Indonesia compared to other countries is reflected in the 2015 PISA results. Indonesia is ranked 62 out of 70 countries that took the test (OECD, 2015). This reflects that the level of students' creative thinking skills in Indonesia is still low. This shows the need for innovation in learning mathematics. Innovation is often equated with mathematical thinking in terms of techniques and inventions (Wang and Shang, 2014) but also related to the teaching of mathematics (M. Karwowski et al, 2017).

Adversity Quotient (AQ) is a person's intelligence in the face of problems. Shivaranjani (2014) states that AQ can describe how well a person is in overcoming problems. The skills to deal with problems is different in each student. According to Stoltz (2000), AQ has three categories low is called quitter, medium is called camper, and high is called climber. Quitters are a group of people who are less than willing to accept challenges in their lives. Campers are groups of people who already have willingness to face the problems and challenges, but they give up because they feel they are no longer able to face the challenges. While climbers are a group of people who choose to stay afloat in dealing with various things that might come, whether it is a problem, a challenge, an obstacle, and other things that continue to come every day.

Mathematical anxiety is a feeling of fear, full of fear, an unpleasant horror that many people through when they faced mathematical problem solving (Maloney et al 2014). Goldin (2002) states that mathematics anxiety is one of the emotional conditions of students which hinders cognitive processes. According to Cavanagh & Sparrow (2010) in Cooke (2011) mathematics anxiety is divided into three, namely low anxiety, medium anxiety, and high anxiety.

Based on observation at SMP Negeri 9 Semarang and SMP Negeri 8 Semarang, there are still many students who are less skilled in solving problems and provide alternative answers, due to the lack of training in creative thinking, especially in solving mathematical problems. This is in line with the opinion of Noer, S.H. (2009) that the creative thinking skills is one of the higher order thinking skilla that is currently still lack attention of teachers in learning mathematics. The lack of creative thinking is characterized by students who only memorize mathematical formulas without linking mathematical concepts that have been obtained, copying and recording the ways given by the teacher, without thinking of the other ways to solve the problems. The purpose of this research is to find a description of students' creative thinking patterns in the category of climber, camper, and quitter with low, medium, and high math anxiety.

METHOD

This research using qualitative approach to the research with artistic or less patterned process and interpretative because the research data is more concerned with the interpretation of data to describe and understand something (Sugiyono, 2011). Qualitative research aims to understand the phenomena experienced by research subjects (Moleong, 2013). Sugiyono (2011) explains that qualitative research is based on the philosophy of postpositivism, which is used to examine natural object conditions, where researchers are the key of instruments, data collection techniques are carried out by triangulation (combined), data analysis is inductive or qualitative, and research results is more on meaning rather than generalization. Qualitative research methods

in this study are used to describe students' creative thinking skills, describe students' adversity quotient, and describe students' mathematical anxiety.

The research design by analyzing the creative thinking skills, adversity quotient, and mathematics anxiety of students in SMP Negeri 9 Semarang and SMP Negeri 8 Semarang grade VIII. This sample was chosen based on the consideration of researchers, based on needs and considered this sample representative.

Researchers choose two schools to be the subjects of research. To find out the students' creative thinking skills, a creative thinking skills test was conducted on each student. Next, the researchers gave a mathematics anxiety questionnaire and an adversity quotient (AQ) questionnaire to each students. Furthermore, students who has the criteria for AQ type climber with low anxiety, AQ type climber with medium anxiety, AQ type climber with high anxiety, AQ type camper with low anxiety, AQ type camper with medium anxiety, AQ type camper with high anxiety, AQ type quitter with low anxiety, AQ type quitter with medium anxiety, AQ type quitter with high anxiety which will be selected by two students from each of these criteria for in-depth interviews. Furthermore, interviews were conducted with each selected student selected based on the criteria above.

RESULTS AND DISCUSSION

Student's adversity quotient data was obtained by giving an adversity quotient questionnaire to students of class VIII C of SMP N 8 Semarang consist of 36 students, students of SMP N 9 Semarang at class VIII F consist of 32 students, and class VIII G by 32 students. After scoring according to the guidelines, students are grouped into climber's students, camper's students, and quitter's students. The results of the adversity quotient questionnaire are shown in table 1.

Table 1. Adversity Quotient Level

No	Adversity Quotient Level	Number of students
1	Climber	25
2	Camper	46
3	Quitter	29
	Total	100

Based on the data in table 1 there are 25 climber's students, 9 students in VIII F, 8 students in VIII G, and 8 student in VIII C, 46 camper's students, 15 students in VIII F, 16 students in VIII G, and 15 students in VIII C, 30 quitter's students, 8 students in VIII F, 8 students in VIII G, and 13 students in VIII C.

To obtain mathematical anxiety data, researcher gave mathematics anxiety tests to students of class VIII C SMP N 8 Semarang consist of 36 students, students of SMP N 9 Semarang in class VIII F consist of 32 students, and students in class VIII G consist of 32 students. After scoring according to the guidelines, students are grouped into students with low anxiety, students with medium anxiety, and students with high anxiety. The results of the mathematics anxiety test are shown in Table 2.

Table 2. Mathematics Anxiety Level

No	Math Anxiety Level	Number of Student
1	Low Anxiety	23
2	Medium Anxiety	47
3	High Anxiety	30
	Total	100

Based on the data in table 2 there are 23 students have low mathematics anxiety, 9 students from VIII F, 8 students from VIII G, and 6 students from VIII C, 47 students have medium mathematics anxiety, 15 students from VIII F, 16 students from VIII G, and 16 students from VIII C, 30 students have high mathematics anxiety, 8 students from VIII F, 8 students from VIII G, and 14 students from VIII C.From the results of the adversity quotient and mathematics anxiety questionnaire, then 2 students who each had adversity quotient and mathematics anxiety were selected based on these categories.

From the results of the study, it was found that the climber's students with low anxiety had the highest score of creative thinking skills. Climber's students with low anxiety can solve mathematical creative thinking skills well. Climber's students with low anxiety satisfy all the indicators of creative thinking skills, there are fluency, flexibility, and novelty. So it can be concluded that the climber's students with low anxiety classified as creative students.

Climber's students with medium anxiety are being able to solve mathematical creative thinking skills well. Climber's students with medium anxiety are fulfilling all the indicators of creative thinking skill in the problem there are fluency, flexibility, and novelty. So it can be concluded that the climber's students with medium anxiety is classified as creative students.

Climber's students with high anxiety have not been able to solve mathematical creative thinking skills well. Climber's students with high anxiety only satisfy one indicator of the creative thinking skills in the problem, there is fluency. However, the climber's students with high anxiety had tried their best to solve the problems given by the researchers, but the results were less than optimal. This is influenced by the high mathematics anxiety in students. So it can be concluded that the climber's students with high anxiety is classified as less-creative students.

Camper's students with low anxiety can't solve mathematical creative thinking skills well. Camper's students with low anxiety only satisfy two indicators of creative thinking skills in the problem, there are fluency, and flexibility. So it can be concluded that the camper's students with low anxiety are classified as less creative students.

Camper's students with medium anxiety have not been able to solve mathematical creative thinking skills well. Camper's students with medium anxiety only satisfy one indicator of creative thinking skills in the problem, fluency. Subjects have not been able to use different strategies in solving mathematical problems. So it can be concluded that the camper's students with medium anxiety are classified as less creative students.

Camper's students with high anxiety have not been able to solve mathematical creative thinking skills well. Camper's students with high anxiety only satisfy one indicator of creative thinking skills in the problem, fluency. Subjects have not been able to use different strategies in solving mathematical problems. So it can be concluded that the camper's students with high anxiety are less creative students.

Quitter's students with low anxiety cannot solve mathematical creative thinking skills well. Quitter's students with low anxiety not satisfy the indicators of creative thinking skills that exist in the problem. The subject has not been able to solve the problem according to the indicators of creative thinking skills. So it can be concluded that the quitter's students with low anxiety classified as not creative students.

Quitter's students with medium anxiety cannot solve mathematical creative thinking skills well. Quitter's students with medium anxiety not satisfy the indicators of creative thinking skills that exist in the problem. The subject has not been able to solve the problem according to the indicators of creative thinking skills. So it can be concluded that the quitter category students with anxiety are classified as not creative students.

Quitter's students with high anxiety cannot solve math creative thinking skills well. Quitter's students with high anxiety not satisfy the indicators of creative thinking skills that exist in the problem. The subject has not been able to solve the problem according to the indicators of creative thinking skills. So it can be concluded that the quitter's students with high anxiety are not creative students.

Table 3. Result of Creative Thinking Skills Tes

AQ	Mathematics Anxiety		
	Low anxiety	Medium anxiety	High anxiety
Climber	CREATIVE fluency flexibility novelty	CREATIVE fluency flexibility novelty	LESS CREATIVE fluency
Camper	LESS CREATIVE fluency flexibility	LESS CREATIVE fluency	LESS CREATIVE fluency
Quitter	NOT CREATIVE Not fulfill the indicator	NOT CREATIVE Not fulfill the indicator	NOT CREATIVE Not fulfill the indicator

From the table 3 above it's obtained that the climber's students with low anxiety and the climber's students with medium anxiety can solve problems very well and fulfill all indicators of creative thinking skills. This agrees Muna's research (2014); Darojat (2016) that climber's students can solve problems well. But for students with high anxiety, they can only fulfill one indicator of creative thinking skills, fluency. Climber's students have high spirit and try their best in solving mathematical problems, but because students have high levels of anxiety make students less thorough and not confident in solving problems. This is in line with the research of Ramirez, et al, 2015 that students with high mathematical abilities, mathematics anxiety is negatively correlated

with mathematical abilities, especially when making strategies in problem solving. In general, students with high anxiety have low mathematical skill (Beilock, S.L. & Chang, H., 2016).

Camper's student with low anxiety can satisfy two indicators, fluency and flexibility. This student is able to solve problems in a variety ways, able to use new strategies but have not been able to generalize mathematical solutions. For camper's students with medium anxiety and camper's students with high anxiety only satisfy one indicator of creative thinking skills, fluency. The difference in camper's students is also influenced by mathematical anxiety. Mathematical anxiety and mathematical ability have a negative correlation (Beilock, S.L. & Chang, H., 2016). Camper's students are actually interested in problems and challenges, but they afraid to take risks and feel satisfied with what they achieved (Sari, Sutopo, & Aryuna, 2016; Bennu, 2012, Stolz, 2000).

In quitter's students with low anxiety, quitter's students with medium anxiety, and quitter's students with high anxiety not fullfill the indicators of creative thinking skill. Quitter's students not to be able to look for strategies in finding problems solutions. Quitter's students only can understand the questions and write down the information obtained from the questions. This is in accordance with research (Yani, et al, 2015) that quitter's students have difficulty in solving problems.

CONCLUSION

Based on the findings and discussion data, it can be conclude that: that (1) creative thinking skills in climber students classified creative (able to satisfy fluency, flexibility, and novelty) and less creative (able to satisfy fluency, and flexibility), (2) creative thinking skills in camper students classified less creative, they were able to satisfy fluency, and flexibility , (3) creative thinking skills in quitter students classified not creative, they were only able to satisfy fluency. Because the subjects learn in a class, it is recommended that improvements in mathematics learning for all students require teaching methods to reduce mathematics anxiety and increase adversity quotient so students can use mathematical creative thinking skills well.

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