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The Innovation Breakthrough in Digital and Disruptive Era
Creativity of Junior High School Students in Solving Problems Viewed From Cognitive Style

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ABSTRACT
Creative thinking is the ability of every individual to process information to build new ideas that are born from encouragement from themselves and their environment. The research objective was to determine the creativity of reflective students (S-R) and impulsive students (S-I) in solving open ended questions. The indicators used to measure student creativity are fluency, flexibility, and originality. The subjects that were targeted in this study were students who were at the VIII grade level of junior high school. The data collection method used was the MFFT (Matching Familiar Figure Test), written tests, and interviews. To categorize students into reflective and impulsive cognitive styles using the MFFT test, while to reveal students’ creativity in solving problems using a written test. The results of this study explain that reflective students (S-R) have a level of creative thinking at level 4, namely the very creative category (fluency, flexibility, and originality). While impulsive students (S-I) have a level of creative thinking at level 3, namely the creative category (fluency and flexibility). Reflective students in solving problems better than impulsive students.

Keywords: Creativity, Reflective, Impulsive, Open-ended Questions.

1. INTRODUCTION
One of the most important goals in learning mathematics is to develop students' critical thinking skills, creative, and cooperative skills. In [1] Number 22 concerning the vision and mission of education that one of the important components contained in the Profil Pelajar Pancasila is creative thinking. But teachers don't know exactly how to develop creative thinking. This is the responsibility of mathematics teachers in developing students’ creativity.

Creativity is an important ability to study, so many experts have defined creativity. According to Asrori, creativity is the ability that every individual has to create something new or combine existing works into something new [2]. Creativity is the ability of each individual to build something new, either in the form of an idea or work. [3] states that creativity is the ability to solve problems. [4] defines creativity as a mental activity to acquire something new both in the form of concepts, understanding, and inventions. However, from this definition there is no single standard definition of creativity, because standardizing the definition of creativity actually stifles the meaning of creativity itself.

Therefore, researchers define creativity in processing information to build new and logical things.

Activities in learning mathematics that can encourage student creativity are through mathematical problem solving activities. In solving a problem with several approaches, creativity is needed [5]. According to [6] the task of solving math problems can guide students to be able to develop their creativity. One form of problem-solving assignment that can be applied to develop students' creative abilities is to use open-ended questions.

Open-ended questions are not just memorization which has one way of solving, but these questions are questions that have more than one solution and how to solve them. Applying the open-ended form of questions can give students a sense of accomplishment and fulfillment because it makes it possible for good students who have less math skills to come up with their own solutions in their own way. In the journey of finding diverse solutions and various approaches, students can submit many answers in solving problems (fluency), design new strategies to overcome unsolved problems or use different ways of solving problems (flexibility), and think of very different ideas. Intelligent
and unexpected or build something different (originality) [7]. In short, through open ended questions are very effective in fostering students' mathematical creativity.

Siswono explained that the results obtained by each individual in solving problems have differences or levels in mathematical creative thinking [8]. Based on Siswono's ranking, the level of students' mathematical creative thinking ability is divided into 5 levels, namely: Level 4 (very creative) if students are able to fulfill the three indicators of creative thinking (fluency, flexibility and originality) in solving problems, Level 3 (creative) if students able to meet indicators of fluency and originality or flexibility and fluency in solving problems, Level 2 (quite creative) if students are able to meet indicators of originality or flexibility in solving problems, level 1 (less creative) if students are only able to meet indicators of fluency in solving problems, and level 0 (not creative) if students are unable to show the three indicators of creative thinking [9].

In solving open ended questions each student has a different level of thinking [10], [11]. This difference is caused because everyone has a different way of thinking in processing information to solve problems. In processing the information provided, there are students who are able to solve problems in a short time and some are able to solve problems in a long time. Related to this, [12] divides student learning styles related to the use of time and accuracy in answering into two, namely impulsive and reflective. Impulsive learning style, that is, groups of students are fast and inaccurate, slow in solving problems, while students who are reflective are slow and accurate in solving problems. [13] states that students who have a reflective cognitive style have better creativity than students who have an impulsive cognitive style in problem solving.

2. RESEARCH METHODS

This study was designed to determine the creativity of junior high school students in solving problems in terms of cognitive style. The approach applied to this research is descriptive qualitative. The subjects that were targeted in this study were 20 students of grade VIII junior high school. The instruments used are divided into the MFFT test (Matching Familiar Figure Test), a creativity test in the form of open ended questions which aim to find out in depth the students' creative thinking activities in solving problems.

To categorize students' cognitive styles, the MFFT test is given. After that, two subjects were selected, one student each with a reflective and impulsive cognitive style. The next stage is to measure students' mathematical creative thinking abilities by using open-ended questions which aim to find out in depth the students' creative thinking activities in solving problems.

The observed aspects related to student creativity are (1) fluency, namely the ability of students to produce answers in more than one way, (2) flexibility, namely the ability of students to use different approaches (strategies/methods) to obtain answers, and (3) originality namely the ability of students to produce answers or approaches to obtain answers that do not imitate others, are not commonly used by the students themselves or and are original to their own ideas. In the following, the results of reflective (S-R) and impulsive (S-I) students' creative thinking abilities are presented in solving open ended questions.

3. Result and Discussion

3.1. Results of reflective (S-R) and impulsive (S-I) students' creative thinking

The activity of student creative thinking (S-R). Being able to produce more than one correct answer, this can be seen from the results of the student's answers being able to present 8 different completion answers. S-R is able to use more than one different way to get an answer. S-R uses 2 ways, namely using straight lines and a combination of straight lines and wavy lines to get different answers. S-R is also able to produce answers or approaches to obtain answers that do not imitate other people and are original to their own ideas. S-R is able to generate answers from a combination of straight lines and curved lines and combine them with flat figures such as trapezoids, rectangles, and parallelograms and triangles. Based on the results obtained, S-R is able to meet the three indicators, namely fluency, flexibility, and originality.

The activity of student creative thinking (S-I). Being able to produce more than one correct answer, this can be seen from the results of the student's answers being able to present 6 different completion answers. S-I is able to use more than one different way to get answers. S-I uses 2 ways, namely using straight lines and plane shapes that are already known to obtain an answer. S-I is not able to come up with strategies/ways to get answers that the teacher has never taught in class.
Based on the results obtained by the S-I, it only fulfills 2 indicators, namely fluency and flexibility.

3.2. Discussion

Based results of the study, it can be stated that subjects with a reflective cognitive style (S-R) are able to demonstrate all three indicators of creative thinking (fluency, flexibility, and originality) in solving open-ended questions. Reflective student ability level (S-R) is at level 4 (very creative) because all indicators of creative thinking are met. Based on research Machromah et al., 2015; Siswono, 2008; Widayustuti et al., 2021) that students are said to be very creative or at level 4 if these students fulfill the three indicators of creative thinking, namely fluency, flexibility, and originality. This achievement is supported by research results [14] that reflective subjects are able to express clearly and in detail the results of the answers obtained, are able to explain relationships and interrelationships between concepts, and are able to solve problems in more than one way. Santrock also explained that reflective students are more capable of setting their own learning goals and concentrating on relevant information [15].

Subjects with an impulsive cognitive style (S-I) were able to show two indicators of creative thinking (fluency and flexibility) in solving open-ended questions. The student's ability level (S-I) is at level 3 (creative) because they are only able to bring up two indicators of creative thinking, namely fluency and flexibility. This is supported by research results [9], [11], [16] that students are said to be creative or at level 3 if these students fulfill two indicators of creative thinking, namely fluency and flexibility. This achievement is supported by research results [14] that impulsive subjects are able to disclose in detail some of the results obtained, are able to reveal causal relationships, but there are some answers that cannot be explained by causal relationships and quickly give up when faced with problems the hard one. In addition, according to [15] students who are impulsive in solving problems make more mistakes.

The results obtained from the two subjects show that reflective students are better at solving problems than impulsive students. This is supported by research results [14], [17] that impulsive students tend to be spontaneous in solving problems so that the results obtained still have errors, while reflective students always think before solving a given problem.

4. CONCLUSION

Based on the study of theory and exposure to research results and discussion, researchers can draw conclusions that the creativity of reflective students and impulsive students in solving problems has differences or levels of creative thinking. Reflective students are better at solving problems than impulsive students, this can be seen from the levels obtained where reflective students are at level 4 (very creative) while impulsive students are at level 3 (creative). Given the differences in the abilities of impulsive and reflective students, it is important for teachers to pay more attention to impulsive students. There needs to be more in-depth encouragement and guidance in order to maximize the students' creative thinking abilities. Apart from that, this research can serve as a basic foundation as well as a guide for educators and other researchers to pay more attention to aspects of thinking ability.

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REFERENCES


