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Creative Thinking Ability Based On Mathematical Skills Of Elementary School Students

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Abstract : The purpose of this study was to explore the student's creative thinking abilities in solving realistic mathematical problems. This type of research was qualitative research that used the subject from fifth-grade elementary school students. The subject consisted of 3 students who had different classification of mathematical skills. Data collection techniques are taken from observation, test, and interview. Data analysis was performed by data reduction, data presentation, and conclusions. The data validity techniques are done by triangulation data sources. The result showed that students who had a high and medium mathematical skill, in general, could get good creative thinking ability. Then, students with low mathematical skills had less creative thinking ability. This result could provide an image about student's creative thinking abilities and being an evaluation material in mathematic learning.

Keywords : creative thinking ability, elementary school students

1 INTRODUCTION

CREATIVE thinking ability was very useful to prepare someone to face in future competition. In society, creativity has to be a driving force for someone to create creativity, innovative, and doing scientific research (Hennessey & Amabile, 2010). The creative thinking ability in every aspect of life is expected to be able to provide solutions in every problem faced by them. A person is often involved in a creative activity to overcome the problem faced by them every day (Collard & Looney, 2014). So that the creative thinking ability was important to be owned and developed by each individual. Creative thinking ability has become main competencies to face the challenges of the 21st Century (Rudyanto, Ghufro, & Martono, 2019) that is marked by uncertainty especially due to social, economic and technological changes in the world which revolutionized the concepts and characteristics of education (Craft, 2012). The social demands for creativity would be held continuously in every field of human activity (Baucus, Norton, Baucus & Human, 2008; Dewett, 2007; Lambropoulos, Kampylis & Bakharia, 2009). The next generation would need experience and skill in every field that was not even known. Although it was difficult to predict the skill needed for the future, it meant that we must succeed in solving complex and unclear problems in life (Leila Kashani-Vahid, et al, 2017). In preparing children to face the world that complex and rapidly changing following the times, so it was necessary to develop their creative thinking skills to be ready for these challenges (Piirto, 2011; Xiaojing Gu, 2019). At the school, students needed creative and flexible minds to learn and integrate the new idea of knowledge (Sternberg & Lubart, 1996). Baker, Rudd, and Pomeroy (2001) stated that educators (teachers) should prepare a special curriculum to develop their students' creative thinking abilities. Sternberg & Lubart (1991) was also stated that to develop a student's thinking ability deeply, educators should enable their students to have applied skills in the form of a problem and structured projects. According to

Darr & Fisher (2004), if students are expected to be more independent, they needed to be active and confronted in opportunities that allow them to think, observe and follow the others' thoughts. A study has been proven that the student's creative thinking could be improved through teaching approaches (Torrance, 1972). Therefore, creative thinking ability needed to be improved early on, especially in elementary school students. This ability could be developed through exploration, inquiry, discovery, and problem-solving activities (Ruseffendi, 2006). Based on the great impact of creative thinking ability, it became very important for researchers to look deeper into the creative thinking ability of elementary school students through solving realistic mathematical problems. By knowing student's creative thinking ability, it could be used as a learning evaluation or further research so that mathematics learning could develop and gave facilities for student's creative thinking ability.

2 METHOD

The purpose of this study was to explore the student's creative thinking ability deeply in solving realistic mathematical problems. The type of this research was qualitative research. It was conducted at Margoyasan Elementary School, Yogyakarta, Indonesia in 2018/2019 Academic Year. It was started at Even Semester of 2018/2019 Academic Year, February until July 2019. The subject consisted of 3 students at fifth Grade who had different classification of mathematical skills. They have been got permission from their parent to be subject of this research. Data collection techniques are taken from observation, test, and interview. Data analysis is done by data reduction, data presentation, and conclusions. Then, data validity techniques was performed by triangulation data sources.

3 RESULT AND DISCUSSION

Qualitative data was explored through a test of solving a realistic mathematical problem. After doing this test, students would be interviewed to explain what they had been written about the aspect of creative thinking ability including Fluency Aspects (FLU), Flexibility Aspects (FLE), and Elaboration Aspects (EL). Then, It would be grouped in the category level of student's creative thinking ability namely Very Good category (FLU1), Good category (FLU2), Less category (FLU3), etc. based on the flexibility aspects as well as the elaboration aspects or details. The results of the creative

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thinking ability based on the category level are presented in Figure below.

High Category Subjects of Creative Thinking Ability (S-01)

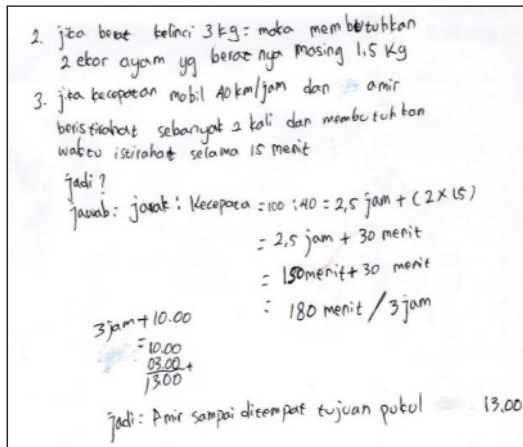


Figure1. Result of Creative Thinking Ability of Subject S-01

Fluency aspects that were measured in question number 2 above, the high category subjects (S-01) were able to present an idea for question number 2 through thinking about chicken with weights 1.5 kg. Then, high category subjects (S-01) answered the problem by comparing the rabbits with weights 3 kg. Based on it, high category subjects (S-01) thought that it was needed 2 chickens to get equal weight between chicken and rabbit ($1.5 \text{ kg} + 1.5 \text{ kg} = 3 \text{ kg}$; got balanced). High category subjects (S-01) also had high creative thinking ability because He only showed one idea. Based on interview results, subjects who had a high category (S-01) actually could answer more than one answer by comparing the weight of rabbits and chicken in a different size. So based on interview results, high category subjects (S-01) in the Fluency Aspects were classified in Excellent Categories (FLU1). The aspects of Flexibility and Elaboration are measured in question number three. In the Flexibility aspects, subjects who had the high category (S-01) are included in the Excellent category (FLE1) because of S-01 in answering a problem used speed formula. S-01 was also completed ideas or answers in detail by comparing speeds of 40km/hour in assuming the speed of the car. An interesting and unique thing happened when S-01 added an explanation that Amir took a rest 2 times during the trip with a duration of 15 minutes in each break. It was made S-01 being very unique in the Elaboration aspects. So it could be concluded that S-01 classified in the Excellent category (EL1) of Elaboration aspects.

Medium Category Subjects of Creative Thinking Ability (S-02)

The subject who had medium ability (S-02) could answered question number 2 by showing one answer or idea, namely it was needed two chickens to get equal weight to rabbit without any explanation for where the answer came from. When interviewed, the students only gave argument that the weight of chicken was in half the weight of rabbit. Therefore, it could be concluded that S-02 was in Good category (FLU2) in

Fluency aspects.

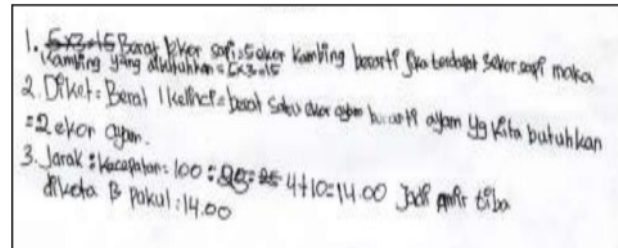


Figure2. Result of Creative Thinking Ability of Subject S-02

The next problem, question number 3, is used to measure Flexibility and Elaboration aspects. In principle, S-02 did not have matter in answering its problem by applying the speed formula; assuming the speed of the car that was driven by Amir was 100km/hour. Then, the time that is needed 4 hours, so Amir arrived at 14.00 in City B. In the Flexibility aspects, S-02 was in a very good category (FLE1). S-02 could complete a detailed answer by assuming the speed of the car 100km/hour. So that, the creative thinking ability of S-02 in Elaboration aspects including in very good criteria (EL1).

Low Category Subjects of Creative Thinking Ability (S-03)

The problem was in question number 2 that measuring Fluency aspects (FLU). Students are required to answer with as many as a possible answers. When answering question number 2, low category subjects (S-03) only gave one idea (it was needed three chicken to answer this question). They did not give a clear explanation about the reason where this idea was taken from. It was strengthened during the interview done, they could not give a rational reason about it. Because of these conditions, the subject who had low creative thinking (S-03) unable to show another idea (answer) in solving the problem of question number 2. So that, Subject S-03 is included in the less category (FLU3).

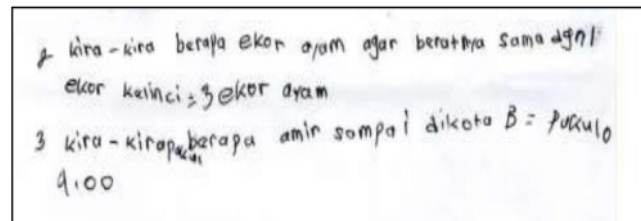


Figure 3. Result of Creative Thinking Ability of Subject S-03

The problem in question number 3 is taken from Flexibility aspects and Elaboration aspects. In the Flexibility aspects, S-03 did not provide much information related to this problem-solving that was given because S-03 only wrote the answer that Amir arrived in City B at 4.00 from City A. Based on these results, S-03 did not give a reason about where the answer is taken from. So the creative thinking ability of these subjects is included in low ability (S-03) and less category (FLU3) of the Flexibility aspects. In Elaboration aspects (EL), S-03 did not specify their idea in detail in completing the settlement without providing any information. So that, S-03 was included in the less category (EL3) of Elaboration aspects. Mathematics learning should be designed to achieve high order

competencies (Rudyanto, Ghufon, & Hartono, 2019). This new paradigm is being a demand that must be used as a guide in carrying out mathematics learning in the schools. This ability needed to be managed to solve a high level of complex problems including unexpected life problems (Mursidik, Samsiyah, & Rudyanto, 2015; Retnawati, Djidu, Kartianom, Apino, & Anazifa, 2018; Rudyanto, Ghufon, Hartono, 2019). In mathematics learning, it was needed innovations to train students' abilities especially to improve their creative thinking ability (Rudyanto, Ghufon, Hartono, 2019). Mathematics is studied for individuals to be able to face any situations of life (Švecová, Rumanová, & Pavlovičová, 2014), remembering of demands and challenges of 21st century that was very competitive and needed relevant creative thinking ability to have. Even future work is needed creative thinking ability (Mahmudi, 2003). But in reality, this creative thinking ability did not develop optimally at school (Anazifa & Djukri, 2017). It was in line with the result of a study where students who had low ability still needed to be fostered to their creative thinking ability. There were still some factors that influenced them. Marpaung (2003) said that "Paradigm teaching is still used in mathematics learning at schools". In line with it, Saharah, Murdiana & Paloloang (2010) also said that "Mathematics learning still uses conventional teaching in the classroom practices". So it can be concluded that mathematics learning was still not facilitate for students comprehensively as an effort to develop their creative thinking abilities.

1 CONCLUSION

The creative thinking of elementary school student's need to be analyzed in-depth and became an evaluation of mathematics learning. Based on this study, the creative thinking abilities among high and medium ability had good creative thinking abilities, but students who had low ability still needed attention and special coaching deeply especially in the learning process so that students could develop their creative thinking abilities. Mathematics learning should be prepared and useful for students in preparing themselves to face the complexities of life. Innovation was being a necessity in the mathematics learning process so that students could have creative thinking ability as early as possible since at elementary school. The innovation that could be used namely applying innovative methods, media, non-routine issues so that this ability could be develop and grow up through its habits in the classroom.

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