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Mathematical creative thinking ability viewed from the types of personality on CPS learning model

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Abstract

The purpose of this research was to describe the learning quality of CPS model towards mathematical creative thinking ability of students viewed from personality types. This research was a mixed method is the type of this research. Mathematical Creative Thinking Skill Test (MCTST) was analyzed quantitatively by classical completeness test and different test average. Furthermore, MCTST was also analyzed qualitatively to gain the description of mathematical creative thinking ability viewed from personality types. The results showed that the quality of CPS mathematics learning model in good category. The artisans subject did not complete mathematical creative thinking aspects, especially fluency and flexibility aspects, guardians subject met all four aspects of mathematical creative thinking, the idealist subject did not meet mathematical creative thinking aspects, especially originality and elaboration aspects, and the rational subject met all four aspects of mathematical creative thinking.

1. Introduction

The Act of Republic of Indonesia Number 20, 2003 declared that a national education function is to develop the capability, character, and civilization of the nation in order to enhance the intellectual life. The students' ability and potential can be developed through mathematics. According to Hudojo (2005), mathematics is a tool to develop a way of thinking includes creative thinking.

As stated by Anwar (2012), creative thinking is an important human characteristic. It means that mathematics has an important role in the development of creative thinking abilities and teamwork so the students are ready to confront the times. Hence, creative thinking ability should be encouraged through the mathematics learning (Purnomo, 2015).

Creative thinking ability is not required to solve mathematics problems only but also to solve problems in the daily life. According to Munandar (2012), creative thinking ability includes four criteria namely fluency, flexibility, originality, and elaboration.

The students' thinking process is influenced by their personality (Dewiyani, 2008). It means that students with different personality types will have different creative thinking skills as well. Keirsey (1998) classifies the personality by human behavior into four types namely artisans, guardians, idealist, and rationals.

National examination data released by Badan Nasional Satuan Pendidikan (BSNP) in 2015 shows the absorption of students SMPN 1 Tonjong in the grain problem with the grille to solve the problem by using Pythagoras concept is 37,41 (school level), 35,82 (district level), 45.57 (provincial level), 54.06 (national level). It means that the absorption of students on the grille to solve the story problem by using Pythagoras concept has not been optimal.

Based on interviews with one of mathematics teachers at SMPN 1 Tonjong, that the creative thinking ability of students in SMPN 1 Tonjong is not optimal. Most of the students solve the math problems according to the steps that teachers have been taught or copying other students' steps.

The quality improvement is needed in the process of learning so the ability of students can be optimal (Sunaringtyas, 2017). Danielson (2013)

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measures the quality of learning based on the following four domains: (1) planning and preparation; (2) classroom environment; (3) instructions; and (4) professional responsibility.

The researcher summarizes the four domains of Danielson's opinion into three domains to measure the quality of learning CPS models, including (1) planning, (2) learning process, (3) professional responsibility.

One of the causes of students' creative thinking ability has not been optimal yet is the learning model selection. Thus, the Creative Problem Solving (CPS) is considered as the appropriate learning model to determine the mathematical creative thinking ability. The steps of CPS model according to Pepkin (2004) include (1) clarification of the problem, (2) brainstorming, (3) evaluation and selection, (4) implementation.

According to Rahman (2015), to create a lesson which leads to the curriculum in 2013, namely in the form of problem-solving as well as to determine the child's thinking about the junior high school creative thinking in solving problems and then usee the CPS model.

Based on the description above, the problems in this research are (1) how is the learning quality of CPS model towards mathematical creative thinking ability of students in class VIII SMPN 1 Tonjong?; (2) how is the mathematical creative thinking ability of students in class VIII SMPN 1 Tonjong viewed from the types of personality on CPS learning model?.

Based on the research problems, the purposes of this study are to (1) describe the learning quality of CPS model towards mathematical creative thinking ability of students in class VIII SMPN 1 Tonjong; (2) describe the mathematical creative thinking ability of students in class VIII SMPN 1 Tonjong viewed from the types of personality on CPS learning model.

2. Methods

The type of this research was a combination research method or a mixed method. The research design was a sequential explanatory design. The researcher collected and analysed the quantitative data in the first phase which were followed by the collection and analysis of the qualitative data in the second phase in order to strengthen the results of quantitative research.

The quantitative data analysis included classical completeness test (z test) and the different test mean (t test). The main subject of this research was the students of VIII D SMPN 1 Tonjong. The quantitative research sample was taken by selecting two classes randomly. Those classes were divided into control and experimental class. The activities in qualitative data analysis were data reduction, data presentation, and conclusion.

In addition, the researcher chose 8 students as the research subjects for the analysis at the level of mathematical creative thinking based on personality type, each personality was represented by 2 selected students.

3. Results & Discussions

To determine the quality of mathematics teaching using CPS models, the researcher looked at the three domains: (1) planning, (2) learning process, (3) professional responsibilities. The quality of learning in this study was reviewed quantitatively and qualitatively.

3.1. Quality of Learning Quantitatively

The quality of quantitative learning is categorized as good if (1) the students' mathematical creative thinking ability on CPS learning model achieves the completeness of classical learning, and (2) the students' mathematical creative thinking ability in the experimental class is higher than the students' mathematical creative thinking ability in the control class.

Based on the result of classical completeness test (z test), it is obtained that $z_{count} = 1.69 > 1.64 = z_{table}$ so H_0 is rejected. It means that the percentage of completeness of test creative thinking ability in learning mathematical model of CPS model is ≥ 70. More than 74.5% of students on CPS learning model achieve the completeness of classical learning.

From the results of the different test average (t test), it is known that $t_{count} = 2.26 > 2.00 = t_{table}$ so H_0 is rejected. It means that the mathematical creative thinking ability of students in the experimental class is higher than students in the control class.

3.2. Quality of Learning Qualitatively

The quality of qualitative learning is assessed for the purpose of measuring the feasibility of learning tools so it can be used in the learning process. The quality of learning in each domain is described as follows.

3.2.1. Planning

The quality of learning with the CPS model in the domain of planning resulted that learning tools in the form of syllabus, RPP, LKPD, mathematical creative thinking test, and valid interview guidelines are in the good category and feasible to use.

3.2.2. Learning Process

The quality of learning with the CPS model on the learning process domain resulted that the average percentage of final assessment of teacher performance observation of 89.3%, In other words, the teacher's performance was in a good criteria and the average percentage of students' final assessment observation activity of 93.94%. It means that the criteria of the learners' activity are very good.

3.2.3. Professional Responsibility

The quality of learning with the CPS model on the professional responsibility domains produced the quiz average 100% of students had met the minimum completeness of criteria. While the test result of mathematical creative thinking was 28 out of 32 learners (87.5%) had completed the minimum completeness of criteria.

3.3. Mathematical Creative Thinking Ability Viewed From the Types of Personality

The result of the mathematical creative thinking ability analysis for each personality type is described as follows.

3.3.1. Mathematical Creative Thinking Ability of Artisan Type

The subjects with artisan personality were able to provide answers to the correct process yet wrong results. Hence, the fluency aspect included in a good category. In the aspect of flexibility, the artisan provided more than one steps, but most of their answers were wrong. So the aspect of flexibility was included in a poor category.

For more, the artisan answered the problem with their own abilities and did not cheat, but most of the answers were wrong. So the originality aspects were included in a quite good category. In the aspect of elaboration, the Artisan gave a detailed answer but the end of the result was still wrong. So the elaboration aspect was included in a quite good category.

3.3.2. Mathematical Creative Thinking Ability of Guardian Type

The subjects with guardian personality were able to give answer with correct process, but the answer had not been completed. So the fluency aspect was included in a good category. In the aspect of flexibility, they gave an answer with more than one way, although there was a mistake in the calculation process. So their flexibility aspect was included in good category.

The Guardian answered the problem with their own abilities and the answers were correct. So the originality aspects are included in a very good category. In the aspect of elaboration, the Guardian give a detailed answer, but there are steps that has not been done. So the elaboration aspects are included in a good category.

3.3.3. Mathematical Creative Thinking Ability of Idealist Type

The subjects with idealist personality gave the correct answer, but there were steps that had not been done. So their fluency aspects was included in quite good category. In the aspect of flexibility, they mostly provided the answers only one right way. As the results, the flexibility aspect was in a good category.

The Idealist answered the problem with their own abilities yet there was a wrong answer. So the originality aspect was in a good enough category. Meanwhile, in the aspect of elaboration, they were able to give a detailed answer but the end of the result was wrong. So the elaboration aspect was in a good enough category.

3.3.4. Mathematical Creative Thinking Ability of Rational Type

The subjects with rational personality were able to give the right answer and correct. Consequently, their fluency aspect was in a very good category. In the aspect of flexibility, they were able to provide answers more than one way with correct process and answers. It went without saying that their flexibility was in a very good category.

In addition, they answered the questions correctly according to their own abilities. So their originality aspect was in a very good category. In the aspect of elaboration, they were able to give a detailed and correct answer. As the results, their elaboration aspect was in a very good category. This finding is relevant to Wijaya's research (2016) that reports that the rational subjects have mathematical creative thinking ability higher than

others on the whole aspects; fluency, flexibility, originality, and elaboration.

4. Conclusion

Based on the previous discussion, it is obtained following conclusions; (1) the learning quality of CPS model towards mathematical creative thinking ability is included in a good category; (2) the Artisan subjects do not fulfill the fluency and flexibility aspects of the mathematical creative thinking ability but stand out in the originality aspect, the Guardian subjects fulfill the four aspects of mathematical creative thinking ability and stand out in the aspects of flexibility and originality, the Idealist subjects do not meet the aspect of originality and elaboration on the mathematical creative thinking ability but stand out in the aspects of flexibility, and the Rational subjects meet the four aspects of mathematical creative thinking ability and stand out from other personality types. However, on the Guardian personality type, it is found the wrong calculation results so it is highly recommended to use of other calculating tools.

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