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Mathematical creative thinking ability of 7th grade student observed from self-confidence in learning RTTW with open ended approach

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Abstract

The purpose of this research is to test students' creative thinking abilities in RTTW learning with open ended approach to achieve individual and classical learning completeness, to test the mathematical creative thinking abilities of students taught in RTTW learning with open ended approach better than Discovery Learning, to describe thinking skills students' mathematical creativity observed from self-confidence in RTTW learning with open ended approach. The method used is mixed method. Quantitative methods are used to determine students' mathematical creative thinking abilities using tests, while the qualitative method used documentation and interviews. The study population was students of Junior High School Grade 7th, with class VII F as the experimental class and VII E as the control class. The research subjects were 6 subjects chosen based on the self-confidence category of class VII F. The results showed that (1) the results of RTTW learning with open ended approach to completing individual learning completeness, (2) the results of the RTTW learning had an open ended approach to achieving classical learning completeness, (3) the mathematical creative thinking abilities of students in RTTW learning with open ended approach better than Discovery Learning, (4) subjects of the upper self-confidence group are able to meet 4 indicators, the middle group is able to meet 2 indicators, the lower group is able to meet 1 indicator.

1. Introduction

Education is an activity that must be done by every individual. Where education plays a very important role in the development of the Indonesian nation. Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by themselves, society, nation and state (Law Number 20 of 2003 article 1 paragraph 1). One of the lessons taught in education is mathematics. Mathematics is a universal science that can be applied in daily life. Besides mathematics is one of the basic sciences that has an important role in the mastery of science and technology According to Dwijanto (2007) as quoted by (Pratiwi *et al.*, 2018) creativity means creativity. Creativity as the ability to create things that are new is almost impossible, therefore creativity is a combination (combination) of things that already existed. The ability to think creatively includes the ability to think at a higher level, a process that does not merely memorize and relay information that is known (Solehuzain & Nur, 2017). Meanwhile, according by (Kuneni et al., 2015) Thinking is a mental activity experienced by someone if they are exposed to a situation or problem that is complicated and must be solved and according by (Firdausi et al., 2018) The ability to think creatively is one of the important rights for participant students, especially in the teaching and learning process. Through the ability to think creatively students are required to be able to understand and solve the problem.

Permendikbud number 58 of 2014 attachment to the mathematics subject guidelines section states that "mathematics subjects need to be provided to students starting at the elementary

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school level in order to equip students with the ability to think logically, analytically, systematically, critically, innovatively, and creatively, as well as the ability to work together ". From the attachment of the Permendikbud, it can be seen that the ability to think creatively becomes one of the important things in learning mathematics.

According to NCTM the ability to think creatively in problem solving standards includes implementing and adjusting various strategies in solving problems.

Based on the results of the 2015 PISA (Program for International Student Assessment) survey, Indonesia received a score of 386 and ranked 63 out of 70 countries surveyed. Indonesia's score is still below the international average score of 490. This shows that students are still unable to develop strategies and approaches to deal with new situations, so it can be said that students' creative thinking abilities are still low. Because Indonesian students are only able to solve simple problems, they have not been able to solve unusual or non-routine problems.

Table 1. Percentage of Mastery of National Examination 37 Semarang Junior High School Question Material for 2017/2018

No.	Tested Ability	School	City/ District	Province of central Java	Natio Nal
1	Number	55,46	54,73	46,99	44,47
2	Aljgebra	55,33	54,15	44,55	42,89
3	Geometry and Measurement	54,90	54,37	44,64	42,80
4	Statistics and probabilities	55,61	54,27	46,15	42,16

Junior High School 37 Semarang is one of school in Semarang. Based on the results of the National Examination in 2017/2018 presented in Table 1 that the average national examination obtained in mathematics is 55,33. For the absorption of aspects, the number gets 55,46. For the algebra aspect that is 55,33, then for the geometry and measurement aspects which is 54,90 and for the aspects of statistics and probabilities that is 55,61. From these results it appears that the ability of geometry to be the lowest ability achieved by students.

This is consistent with the interview of one of the mathematics teachers at Junior High School 37 Semarang on Thursday 10 January 2019 that the ability to think mathematically in Grade 7^{th} students especially in geometry material needs to be improved. Because students are still not accustomed to working on non-routine questions. Apart from the low geometry ability of students, and according to Jagom (2015) that geometry is one part of mathematics that provides problems that solve using divergent thinking.

Munandar (1987) and Supriadi (1994) as quoted by (Hendriana et al., 2017) identified creative people that they have a high sense of curiosity, rich in ideas, imaginative, confident, working hard, optimistic, positive thinking, having a sense of self-ability, likes complex and challenging problems. According to Kunhertanti (2018) self-confidence is a positive mental attitude from someone who is positioned or conditioned to be able to evaluate themselves and their environment so that they feel comfortable doing activities in an effort to achieve planned goals. Therefore, confidence is the basis for the ability to think creatively. Because if students already have high self-confidence, then when students solve a problem, students will use their own mindset in doing it, and are not afraid of being wrong in answering.

According to Ramadhani et al., (2015) efforts to improve the learning process through the selection of appropriate and innovative learning models in learning mathematics in schools is a very important requirement to do. One learning model used is a cooperative learning model with an open ended approach. Cooperative learning according to Slavin (2015) as quoted by (Turgut, 2018) is a learning model where students work together in small groups and help student learning. Therefore, the cooperative learning model is expected to increase student activity in learning and discussion that can increase self-confidence. According to Atikasari & Kinasih (2015) on the cooperative learning model students are given the opportunity to work in small groups to solve or solve problems together. There are several types of cooperative models, one of which is the model of Read, Think, Talk, Write (RTTW), this learning model starts with reading material from learning sources or from worksheets, then with the help of the teacher students are asked to think mathematically, followed by speaking or discussing with a groupmate, at the last stage is writing what has been discussed with a group friend. The groups in this model consist of 4-5 students who are selected heterogeneously. This

learning model was first introduced by the ELA Turnkey Kit for Teachers grades 3-8 May 2014.

To improve the ability to think creatively besides using the RTTW learning model, it also uses the open ended approach. According to Irawan & Edi (2017) the open ended approach is an approach in problem solving that is used to evaluate high-level thinking skills in mathematics learning. According to Pratinuari et al., (2013) The problems given challenge students to think critically, broadly and openly so that students are trained to develop students' creative mathematical thinking abilities related to daily life. The open ended approach can train the novelty of ideas, creativity, criticism, communication-interaction, openness, and socialization. The open ended approach is more concerned with process than outcome. Nohda's open ended approach (1993) as quoted by (Munroe ,2015) is a flexible, student-centered method that has recently gained popularity in the field of mathematics education. The open ended approach can be done individually or groups, which are expected to be able to apply it themselves to solve a problem. The problem is designed maybe with more than one way of doing it. So that the open ended approach is able to challenge students at various levels of cognitive development. Therefore the open ended approach can improve students' creative thinking abilities, because students can solve a problem in their own way.

2. Methods

The method used in this research is mixed methods with sequential explanatory design. Creswell & Plano Clark (2015) defines the mix method as a procedure for collecting, analyzing, and mixing both quantitative and qualitative methods in one study or series of studies to understand problems in research. This study combines two previous forms of research, namely quantitative research and qualitative research.

Quantitative research used true experimental design, namely research that used control classes and experimental classes selected randomly. This study uses a true experimental design in the form of a posttest–only control design. In this design there are two groups, the first is the experimental group, the group that is given the treatment of RTTW learning with an open ended approach, and the second is the control group that is not given treatment (Sugiyono, 2016).

Table 2. Research Design

Class	Treatment	Post-Test
F	X	T
E	-	T

Explanation:
F: Experiment Class
E: Control Class
X: Application of the RTTW learning model with open ended approach
T: The test result of creative thinking ability

The population in this study were all students of class VII Junior High School 37 Semarang. While the sample in this study was taken using simple random sampling and obtained class VII F as an experimental class that is a class that uses RTTW learning with an open ended approach and class VII E as a control class. Qualitative research subjects were taken by purposive sampling technique and 6 subjects were selected based on self-confidence category by considering the ability to think creatively.

The variables in this study are divided into two variables, namely the independent variable and the dependent variable. The independent variable is RTTW learning open ended approach, the dependent variable is the ability to think creatively and self-confidence. The method used in this study is the method of interviews, tests, questionnaires, and documents. The interview method was conducted with the aim of knowing and capturing directly all information from the research subject related to students' creative thinking. The test method is used to collect data on students' creative thinking skills after learning mathematics using RTTW learning with an open ended approach. The questionnaire method is used to measure students' confidence which is then used to classify into the lower, middle, and higher groups. The document method (student's creative thinking ability test sheet) is used during interviews with research subjects.

Quantitative data analysis uses data on the results of students' creative thinking abilities to conduct normality tests, homogeneity tests, proportion tests, two average similarity tests, and two proportional similarity tests.

3. Results & Discussions

Based on the data analysis of students' creative thinking abilities tests it was found that the data is normally distributed and homogeneous.

Hypothesis 1 test was conducted to determine whether students' mathematical creative thinking abilities in RTTW learning had an open ended approach to achieving individual learning completeness. The minimum completeness criteria used in this study is the Minimum School Complete Criteria is 70. The average value of learning in Read, Think, Talk, Write is 78,56. The results of individual learning completeness are presented in Table 3.

Based on Table 3, the average value of a mathematical creative thinking ability test in RTTW learning with open ended approach more than 70.

Table 3. Individual Completeness Test Results

t_{count}	t_{table}	Conclusion	Meaning
5,98	1,70	$t_{count} \geq t_{table}$	The average score of mathematical creative thinking ability test in RTTW learning with open ended approach is more than 70.

Hypothesis 2 test was conducted to find out whether students' mathematical creative thinking abilities in RTTW learning with open ended approach to achieve classical learning completeness of at least 75%. There are 29 students out of 32 students in the class fulfilling individual completeness. Minimum completeness criteria used in the study is the school minimum completeness criteria that is equal to 70. The results of individual learning completeness are presented in Table 4.

Table 4. Classical Completeness Test Results

z_{count}	z_{table}	Conclusion	Meaning
1,875	1,64	$z_{count} \geq z_{table}$	The results of The creative thinking ability of students taught with RTTW learning with open ended approach is more than 75%.

Based on Table 4, it is found that the mathematical creative thinking ability in RTTW learning with open ended approach is classically complete.

Table 5. Two Average Test Results

t_{count}	t_{table}	Conclusion	Meaning
2,05	1,67	$t_{count} \geq t_{table}$	The average results of tests mathematical creative thinking ability with RTTW learning model with open ended approach more than the average results of tests of mathematical creative thinking ability with Discovery Learning

Hypothesis 3 test was conducted to find out whether the average results of students 'mathematical creative thinking abilities in RTTW learning with open ended approach more than the average results of students' mathematical creative thinking abilities in learning with Discovery Learning. The two average test results are presented in Table 5.

Based on the calculation, the average test result of students' mathematical creative thinking ability in RTTW learning with open ended approach is more than the average of creative thinking ability with Discovery Learning.

Hypothesis 4 test to find out whether the proportion of students who have finished learning in RTTW learning has an open ended approach more than the proportion of students who have finished learning in class with the Discovery Learning model. Hypothesis 4 test uses the similarity test of two proportions. The results of the two proportion tests are presented in Table 6.

Table 6. Two Proportion Test Results

z_{count}	z_{table}	Conclusion	Meaning
1,91	1,64	$z_{count} \geq z_{table}$	The proportion of students creative msthematical learning abilities in RTTW learning with open ended approach is more than the proportion of mathematical creative thinking abilities in Discovery Learning

So, the proportion of students who finish studying in class with RTTW learning with open ended approach is more than the proportion of students who finish studying in class with Discovery Learning models..

3.1. The Completeness of Students' Mathematical Creative Thinking Abilities

Based on the results of tests of students' mathematical creative thinking abilities that have been carried out in classes that are given open ended RTTW learning, out of 32 students who took the 29 tests among them scored more than or equal to 70. Meanwhile, 3 students got less than 70. Based on the results Final test in class with RTTW learning with *open ended* approach obtained an average of 78.56. While in the class with Discovery Learning model, it was obtained an average of 74.25. Data also remains tested using the two-means test (hypothesis test 1) so that it can be generalized or inferred for the population. Based on the results of hypothesis 1 test, it was found that the average final test results of students' mathematical creative thinking abilities in RTTW learning had an open ended approach of more than 70. Then the percentage of students who completed the experimental class was 90,.6%. Even though the percentage is more than 75%, the data must still be tested using the proportion test (hypothesis test 2) so that it can be generalized or inferred for the population, with the hypothesis 2 test it is concluded that the mathematical creative thinking ability of students in RTTW learning is open ended completely classical. This is suitable with the research by Suyitno (2018) the RTTW model can be used as an initial support for the growth of student creativity, the RTTW model also tends to reduce the number of students who were previously unfinished, until finally getting better results.

3.2. The Diifference of Students' Creative Mathematical Thinking Ablity in RTTW learning Model with Open Ended Approach and Discovery Learning Class

In this study, the difference in students' mathematical creative thinking abilities between classes with RTTW learning with open ended approach and classes with the Discovery Learning model is seen from two things namely the average value and the proportion of students who have completed the mathematical creative thinking ability test. Based on the results of tests of mathematical creative thinking ability, the average value of students in classes with RTTW learning with open ended approach is 78,56. While the average value of students in classes with the Discovery Learning model is 74,25. Meanwhile, the proportion of students completing classes with RTTW learning had an open ended approach of 90,6% and the proportion of students completing classes with the Discovery Learning model was 71.8%. Both of these results cannot yet be used to draw conclusions about mathematical creative thinking abilities. In order to make a conclusion, two tests were conducted, namely the average two similarity test (hypothesis test 3) and the proportion test (hypothesis test 4). Based on the hypothesis 3 and hypothesis 4 test results obtained that the students 'mathematical creative thinking abilities in RTTW model with open ended approach better than students' mathematical creative thinking abilities with the Discovery Learning model. Because in RTTW learning, it is very possible for students to be trained in observing, reading carefully, thinking, asking questions, gathering information, discussing, associating, and writing a problem solution as complete as possible, in accordance with the instructions in the problems provided, then communicating, the answers obtained do not have to be the same, but getting used has a reason for writing down these conclusions. Then RTTW learning consists of the read phase, which allows students to read thoroughly, deeply, thoroughly, and critically, so that students better understand what they have to do with a problem or the information they read. At the think stage, students think what they have read, and try to solve problems with information that has been obtained. In the talk stage, students communicate ideas with their group mates. At the write stage, students write the conclusion of ideas from the group

In RTTW learning students are asked to group in order to help students transfer knowledge possessed to other students in learning activities, so that those who understand can help students who do not understand, this is related to Vigotsky learning theory. In addition, when students compile the results of group discussions students will associate their findings with the knowledge they already have, this is related to Ausubel learning theory.

Then with the open ended approach also helps students in the ability to think creatively, this is in accordance with research Lambertus et al., (2013) the use of the open ended approach can improve students' mathematical creative thinking abilities.

In addition, in the study of Faridah et al., (2016) that there was an increase in students' mathematical creative thinking abilities using the open ended approach.

3.3. Description Of Creative Thinking Ability Observed From Self-confidence

The ability to think mathematically creative in this study is the ability to think mathematically creative in working on problems with mathematical creative thinking indicators namely fluency, flexibility, elaboration and originality, while the results of student self-confidence research show that there are three categories of confidence in the experimental class.

Based on the self-confidence questionnaire, students who have mathematical creative thinking abilities are grouped into three categories presented in Table 7.

Based on Table 7, it is known that of the 32 students there were 5 or 15,63% of the many students included in the upper self-confidence category, 21 or by 65,62% of the many students included in the middle confidence category and 6 or by 18,75% of many students fall under the lower self-confidence category. And total of the students were 32 students or 100%.

Table 7. Category of Self-confidence

Category of self confidencr	Many students	Percentage
Upper	5	15,63%
Middle	21	65,62%
Lower	6	18,75%
Total	32	100%

Table 8. Subject Research

Self-confidence		
Upper	Middle	Lower
E-08	E-26	E-11
E-31	E-30	E-19

The research subjects were chosen by two students in each category of confidence. The selection of research subjects is based on the observations of researchers during the learning process that shows the character of that confidence. The selection of subjects is also based on considerations that include the process of student work on tests of mathematical creative thinking abilities of students selected to be research subjects are students who are not easily nervous, speak clearly and awkward, making it easier for researchers when asking questions to the subject, and the selection of research subjects is also based on the results sheet the work of testing his mathematical creative thinking abilities. Students who are the research subjects are presented in Table 8.

After getting 6 research subjects, there are E-08 and E-31 for upper self-confidence, there are E-26 and E-31 for middle self-confidence and E-11 and E-19 for lower self-confidence. The interviews were conducted to find out the description of students' mathematical creative thinking abilities based on self-confidence and used to strengthen quantitative data and completed the research.

A summary of the qualitative can be seen in the Table. A summary of the results of qualitative data analysis on the mathematical creative thinking ability of subjects in the upper self-confidence group is presented in Table 9, beside that the mathematical creative thinking skills of the subjects in the middle self-confidence group are presented in Table 10, and the mathematical creative thinking skills of subjects in the lower self-confidence group are presented in Table 11.

Table 9. Summary of The Mathematical Creative Thinking Ability of The Upper Self-confidence Group Subject

Indicator	Subject E-08	Subject E-30
Fluency	Capable to write problems and answer mathematical problems correctly by writing coherent and correct answers.	Capable to write problems and answer mathematical problems correctly by writing correct answers.
Flexibility	Capable to answer mathematical problems through many alternatives or different ways.	Capable to answer mathematical problems through many alternatives or different ways.
Elaboration	Capable to answer in detail and understand step by step.	Capable to answer with detail answer and understand step by step, even if there are errors calculated.
Originality	Capable to answer and explain mathematical problems using their own language, but it is incomplete because no conclusions are given.	Capable to answer and explain coherently based on their own understanding and be able to explain using their own language.

In Table 9 it is explained that E-08 and E-30 subjects with the category of upper self-confidence were able to achieve all the students' mathematical creative thinking indicators, namely indicators of fluency, flexibility, elaboration and originality. And subjects E-08 and E-30 were very good in the did the examination.

Subject E-08 and Subject E-30 could do the examination, and could explain the answer with correctly and smoothly.

Table 10. Summary of The Mathematical Creative Thinking Ability of The Middle Self-confidence Group Subject

Indicator	Subject E-26	Subject E-31
Fluency	Capable to write problems and answer mathematical problems correctly by writing correct answers.	Capable to write problems and answer mathematical problems correctly by writing coherent answers, even though subject E-31 changes the unit m to km
Flexibility	Had not been able to answer mathematical problems through many alternative answers, because the subject E-26 can only solve with one answer.	Has not been able to answer mathematical problems with several answers, because the subject E-31 only works in one way.
Elaboration	Capable to answer in detail, and understand each step used.	Had not been able to answer in detail, and there are errors in the calculation.
Originality	Capable to explain and answer mathematical problems coherently based on their own understanding and be able to explain using their own language.	Capable to answer mathematical problems with their own understanding and use their own language.

In Table 10 it is explained that subjects E-26 and E-31 with the middle self-confidence category were able to achieve two indicators of mathematical creative thinking namely fluency, and orginality. Because the subjects E-26 and E-31 did not meet the indicators of flexibility, they could work on the problems but could not mention other methods or methods that were different from the ones they used. E-31 subject also did not meet the elaboration indicator because the subject felt confused and unable to work on the given problem. Then it can be concluded that the research subject with confidence is able to solve

the problem of creative thinking skills of fluency and originality.

Table 11. Summary of The Mathematical Creative Thinking Ability of The Lower Self-confidence Group Subject

Indicator	Subject E-11	Subject E-19
Fluency	Capable to write problems and answer mathematical problems correctly.	Capable to write problems and answer mathematical problems correctly.
Flexibility	Had not been able to solve mathematical problems in more than one way.	Had not been able to solve mathematical problems, because it is still wrong in understanding the problem and only answer in one way
Elaboration	Had not been able to solve mathematical problems correctly and in detail.	Capable to solve mathematical problems in detail even though they are incomplete.
Originality	Had not been able to solve mathematical problems, and is still wrong in understanding the problem..	Had not been able to solve mathematical problems and is still wrong at work.

Table 11 explains that subjects E-11 and E-19 with lower self-confidence category were able to achieve one indicator, namely fluency. Because the subjects E-11 and E-19 were unable to complete the indicator of flexibility, because they only work in one way. For the elaboration indicator, there were inaccurate work results because students with low self-confidence had not been able to answer the problem given, although there are also those who can do it. As for the indicator of originality students were still wrong in working on the problems and do not understand the purpose of the questions given.

In the mathematical creative thinking ability of students with upper confidence, the average student is able to work on problems smoothly and also meet all the indicators of creative thinking abilities namely fluency, flexibility, elaboration and originality. For the ability to think mathematically creative with middle confidence is reaching the two indicators of mathematical creative thinking abilities, namely fluency and originality. And for students with lower confidence only able to reach one indicator of mathematical creative thinking ability, namely fluency. So that the ability to think creatively in upper confidence is better than the ability to think creatively with mathematical confidence in the middle and lower. This is suitable with the research by (Jahani & Behzadi, 2014) that there is a strong relationship between self-confidence and mathematical ability, so the higher the student's self-confidence, the mathematical ability of students will also increase. Also the research by (Vandini, 2015) that if students want to obtain good learning achievements students are expected to have good self-confidence as well. Increased confidence will also be followed by increased learning achievement.

In the mathematical creative thinking ability of students with middle self-confidence, the average student is still unable to work on problems smoothly, has not been able to work on problems in other ways, and has not been able to work on new problems that have never been encountered. Students with middle self-confidence are able to solve problems according to mathematical creative thinking indicators namely fluency, and originality. This is in accordance with research conducted by (Tresnawati et al., 2017) that students with a lack of confidence in mathematics will tend to work on problem solving in accordance with procedures and rely more on memorization, so that students become weak in decision making during the process solving the problem he experienced. While students with lower self-confidence are only able to solve problems according to the fluency indicator. This is because students feel hesitant in working on and are afraid of wrong in solving problems. This is in accordance with research by (Hendriana, 2014) that a person who does not have full confidence will only achieve less than what he could have completed. Beside that, there were students have lower self-confidence but had score one of indicators more than middle self-confidence. This is because there were some students who have low self-confidence but there was still a willingness and enthusiasm to learn and work on problems.

4. Conclusion

Based on the results and discussion of the research, it can be concluded that: 1) students' mathematical creative thinking ability in RTTW learning with open ended approach is completed individually, 2) students' mathematical creative thinking ability in RTTW learning with open ended approach is completed classical, 3) students' mathematical creative thinking ability RTTW learning with open ended approach is better than mathematical creative thinking ability with Discovery Learning learning.

The subject of the upper self-confidence group is being able to meet the indicators of fluency, flexibility, elaboration and originality. The subject of the middle self-confidence group is being able to meet the indicators of fluency and originality. The subject of the lower self-confidence group is able to meet the fluency indicator.

Subjects with upper self-confidence have the ability to think creatively are better than subjects with middle self-confidence. Then subjects with middle self-confidence have the ability to think creatively are better than subjects with lower self-confidence.

There are students with low self-confidence groups who have better grades than students with middle self-confidence groups, so teachers must be more aware of students who have low self-confidence but who have high enthusiasm for learning.

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