The effectiveness of inquiry method to the creative thinking ability of junior high school students on mathematical learning

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**Abstract.** This research aims to know the effectiveness of inquiry method and scientific approach to the creative thinking ability of junior high school students on mathematical learning, and is the inquiry method more effective than the scientific approach to the creative thinking ability of junior high school students on mathematical learning. The type of the research is Quasy experiment with pretest post-test non equivalent control group method. This research applies online learning with the help of the messenger application which is whatsapp group class and the media learning support applications is google docs. The subjects of this research were 28 students of experiment class and 25 students of control class. The instruments on this research are the creative thinking ability test and observation sheet implementation of learning. Hypotheses trial method uses one sample t-test and independent samples t-test that helped by software SPSS 23. Based on the result of hypotheses trial with a significance level of 5% concluded that inquiry method and scientific approach are effective to the creative thinking ability of junior high school students on mathematical learning, and inquiry method is more effective than scientific approach to the creative thinking ability of junior high school students on mathematical learning.

1. Introduction

A method is a person’s way or way to achieve a desired goal (Darmadi, 2017: 175). Methods provide practical direction for overcoming the level of learning materials (Darmadi, 2017: 178). That makes the methods important in the learning process.

Learning is the learning process of learning participant’s interactions with educators and learning resources in a learning ward (Darmadi, 2017: 176). The learning environment encourages a student’s enthusiasm for learning such as his or her high curiosity, the motivation for asking is higher, critical thinking, creative thinking, and always sensitive to the informed issues he or she encounters.

The 2003 national education system’s, 20th law states that national education is intended to enhance the potential of learners to become human believers, noble, healthy, competent, creative, independent, and a democratic and responsible citizen. A scientific approach is found in the implementation of curriculum 2013. According to the 2013 government regulation No.65 on process standards, the scientific approach to learning includes 5M, which is: observe, ask, write, try, set up networking for all subjects (Ika & Laila, 2015: 2).

Math plays a major role in daily life (Umbara, 2017: 12). The application of relevant mathematics in the student’s creative thinking process to solve a problem. Mathematics is taught with the purpose of preparing learners to be able to use mathematics and the mathematical mind-set of thinking systematically, logically, critical, creative and consistent in everyday life (Umbara, 2017: 12).

There are various learning methods that can be references to facilitating student learning. In this study, researchers would try inquiry methods to enhance a variety of learning methods that teachers could use in teaching mathematics. But in the covid-19 pandemic situation, it is planned to use slightly different learns-adjustments that have been implemented in groups to the transform into individual learning and online learning.

An inquiry methods can facilitate students in terms of developing the thought process. Sanjaya (2006: 119) mentions that the learning process is based on systematic search and discovery. The knowledge and skills a student acquires are not the result of simply remembering or even memorizing a set of facts, but the results are self-discovery and the construction of self-knowledge based on the facts issues he encounters. National research council (Kawuwung, 2019: 8) suggests that in general an inquiry learning strategy focuses on the discovery process for the acquisition of knowledge, and one of its aims is for students to have the same scientific mind-set and workings as a scientist. Kawuwung (2019: 10) mentioned that inquiry makes it a practice for students to behave like scientific scienticle-conscientioous, ardent, objective, creative, and respectful of the opinions of others. Significantly, the inquiry method will help students train their creative thinking ability to solve mathematical problems. Based on the above description, researchers believe that through the student inquiry method a student will be given detailed instruction on how to think creatively through the activities.

Mahmudi (2008) said that the talk of creativity in mathematics was more stressed on the aspect of the process of creative thinking. Pehkonen (1999) & Krutetskii (1976) & Silver (1997) said that creative thinking in mathematics is a logical and intuitive combination of divergent thinking, but in a paying attention to the versatility, eloquence, and novelty (Suripah, 2017: 150). According to Haylock (1997) to know creative thinking in mathematics is to see students’ responses to solving problems by observing the process and thinking diversions include flexibility, authenticity, and worthiness (Suripah, 2017: 150). This indicates that by creative thinking a person is also capable of critical thinking and yet is by no means the opposite. The divergent thinking process for finding new solutions emphasize on fluently, flexibility, originality, and elaboration (Soeyono, 2014: p.12).

To know the student’s creative thinking ability criteria, researcher looked at the results of the math subjects national exam scores in year 2018/2019. As for the competence indicators that are tested on the national exam for the level of reasoning that are analyzing, evaluating, synthesizing or creating, interpreting, concluding. Indicators at the cognitive level of reason are interrelated with student’s creative thinking abilities. Indicators analyze the problem in statistic-data centralization materials at the junior high school state 3 Tempel level there 33,33% students who answered correctly, at Sleman district level there 38,71% students who answered correctly, at the Yogyakarta special region level there 37,35% students who answered correctly, and at the national level there 20,37% students who answered correctly. This suggests that students’ creative thinking ability to analyze a problem related to data centralization is still not optimal.

Based on research by Asih Miatun (2013), an effective inquiry study model is based on the attainment of mathematics and the character of a junior high student level-side mathematical study. In addition, Anisya Septiana’s research (2013) states that the inquiry approach is effectively based on the the ability to solve mathematical problems in a flat-side building material at 1 Curup Junior High School of class VIII in second semester. According to Nurkasanah research (2011), problem based and inquiry studies are conducted effectively in view of the ability of reasoning and attitude toward the eighth grade student mathematics at 1 Banguntapan Bantul Junior High School. It is seen that inquiry study has the potential to methanized indicator slices with creative thinking ability.

Based on the above description, the application of the inquiry method of mathematical learning is expected to be one of the alternatives to use to train students’ creative thinking ability. Because of this researchers are intrigued to quasy experiment to see the effectiveness of inquiry methods on the ability of creative thinking especially the statistical data concentrations of eighth grade students in the 3 Tempel Junior High School. The title drawn on the research is “The Effectiveness of Inquiry Method to the Creative Thinking Ability of Junior High School Students on Mathematical Learning”.

1. Research Methods

## Research Types

This type of research is a quantitative research with the Quasy experiment.

## Time and Place of Research

The research is carried out on April 22 to May 11, 2020. The research facility was conclude at 3 Tempel Junior High School, located on Banjarharjo street, Banjarharjo, Pondokrejo, Tempel sub-district, Sleman district, Yogyakarta special region.

* 1. *Research Subject*

The subject of this research are 28 student class VIII B and 25 student class VIII A at Tempel Junior High School in the school year 2019/2020.

* 1. *Research Design*

Research design uses pretest-post-test non-equivalent control group with one treatment which is the application of the learning method. The research wants to see the effectiveness of treatment of students creative thinking abilities. The research applies online learning with the help of the messenger application which is whatsapp’s group class as a media communication between students and teachers, and the learning support application google docs as a media for collecting students’ work. The application of learning methods takes place in two groups that are believed to have the same abilities. In the first group as an experiment class is conducted learning using the inquiry method, while in the second group as a control class is carried on learning using a scientific approach.

* 1. *Instrument and Data Collection Techniques*

[The instruments in this study are test instruments of the creative thinking ability test and nontest instruments of the observational sheets of the activities of learning.](http://www.u-dictionary.com/home/word/The%20instruments%20used%20in%20this%20study%20are%20test%20instruments%20of%20the%20creative%20thinking%20ability%20test%20and%20nontesting%20instruments%20of%20the%20observational%20sheets%20of%20the%20activities%20of%20learning./from/en/to/hi) Test instruments of pretest and posttest. [The](http://www.u-dictionary.com/home/word/Learning%20activities%20are%20said%20to%20be%20accomplished%20if%20the%20minimum%20percentage%20of%20learning%20performance%20is%20earned/from/en/to/hi) minimum percentage of learnability is 87,5%. [The core activity in the experiment class is ask questions, guess completion, look up the information needed, check the conclusion, and draw the conclusions.](http://www.u-dictionary.com/home/word/At%20the%20core%20activity%20experiment%20class%20to%20be%20conducted%20is%20to%20ask%20questions%2C%20guess%20completion%2C%20look%20up%20the%20information%20needed%2C%20check%20the%20conclusion%2C%20and%20draw%20the%20conclusions./from/en/to/hi) [The core activity in the control class is](http://www.u-dictionary.com/home/word/To%20the%20core%20activity%20control%20class%20to%20carry%20out%20that%20is/from/en/to/hi) observing, asking, collecting data or information, associating or reasoning, and communicating. [The data-collecting techniques in this study are tests and nontes.](http://www.u-dictionary.com/home/word/The%20data-collecting%20techniques%20used%20in%20this%20study%20are%20tests%20and%20nontes.%20Tests%20are%20used%20to%20measure%20students%27%20creative%20thinking%20abilities%2C%20while%20nontes%20are%20used%20to%20measure%20the%20correct%20implementation%20of%20the%20learning%20in%20the%20class%20against%20the%20RPP%20that%20is%20referral./from/en/to/hi)

## Data Analysis Techniques

[Data analysis in this research uses descriptove analysis to identify student’s creative thinking abilities. Additionally, researchers perform data analysis based on the observations of the learning activities.](http://www.u-dictionary.com/home/word/Data%20analysis%20in%20this%20study%20USES%20descriptive%20analysis.%20In%20descriptive%20analysis%2C%20researchers%20use%20quantitative%20analysis%20to%20know%20students%27%20creative%20thinking%20ability.%20In%20addition%2C%20the%20researchers%20conducted%20a%20data%20analysis%20based%20on%20the%20study%20activities%20of%20the%20RPGS.%20The%20analysis%20is%20intended%20as%20backups%20data%20of%20quantitative%20data./from/en/to/hi)

 [The data to be described are the test scores of the student’s creative thinking ability from both research classes before and after treatment. In this research the data is described using the criteria for creative thinking ability can be seen at table 1 as follows.](http://www.u-dictionary.com/home/word/The%20data%20to%20be%20described%20are%20the%20test%20scores%20of%20the%20students%27%20creative%20thinking%20ability%20from%20both%20research%20classes%20before%20and%20after%20treatment.%20The%20scores%20are%20converged%20into%20scores%20on%20a%20scale%20of%20100./from/en/to/hi)

**Table 1.** Creative Thinking Ability Criteria

|  |  |  |
| --- | --- | --- |
| No. | Score Interval | Criteria |
| 1. | $$x>90$$ | Excellent |
| 2. | $$75\leq x\leq 90$$ | High |
| 3. | $$60<x<75$$ | Medium |
| 4. | $$45<x\leq 60$$ | Low |
| 5. | $$x\leq 45$$ | Lowest |

* 1. *Results of Research and Discussions*

[The research aims to see the effectiveness of inquiry method for the creative thinking ability eighth graders' students in the junior high school state 3 Tempel of statistic-centralized data learning.](http://www.u-dictionary.com/home/word/The%20study%20aims%20to%20see%20the%20effectiveness%20of%20the%20ineffable%20method%20of%20understanding%20the%20eighth%20graders%27%20creative%20thinking%20ability%20in%20the%20country%27s%20junior%20high%20school%203%20outscores%20the%20statisticical%20data%20concentrations./from/en/to/hi) [Learning is not possible in class because of the covid-19 pandemic situation in which students are turned to home study and thus the feasible alternative of performing online learning using the Whatsapp group class as a medium of communication between teachers and students, and the Google docs application as a student media to collect their work.](http://www.u-dictionary.com/home/word/Learning%20is%20not%20possible%20in%20class%20because%20of%20the%20covid-19%20pandemic%20situation%20in%20which%20students%20are%20turned%20to%20home%20study%20and%20thus%20the%20feasible%20alternative%20of%20performing%20online%20learning%20using%20the%20whatsapp%20group%20class%20as%20a%20medium%20of%20communication%20between%20teachers%20and%20students%2C%20and%20the%20Google%20docs%20application%20as%20a%20student%20media%20to%20deliver%20their%20work./from/en/to/hi) [The research lasted six times of meetings on both experimental and control classes.](http://www.u-dictionary.com/home/word/The%20study%20lasted%20six%20times%20of%20meetings%20on%20both%20experimental%20and%20control%20classes.%20At%20the%20first%20meeting%2C%20each%20class%20is%20given%20a%20pretest%20to%20know%20and%20measure%20student%20creative%20thought%20before%20being%20treated%2C%20and%20then%20at%20the%20sixth%20meeting%20a%20posttest%20is%20given%20to%20know%20the%20student%27s%20creative%20thinking%20ability%20after%20being%20given%20treatment.%20At%20the%20second%20to%20fifth%20meeting%20students%20attended%20math%20studies%20with%20statistic-centralized%20data%20readings%20using%20different%20learning%20methods%20to%20suit%20each%20class./from/en/to/hi)

[The data description aims to describe data obtained from the results of pretest and posttest of the creative thinking ability of the student student experiment and control class. The description can be seen on the following table 2.](http://www.u-dictionary.com/home/word/The%20data%20description%20aims%20to%20describe%20data%20obtained%20from%20the%20results%20of%20pretest%20and%20posttest%20of%20the%20creative%20thinking%20ability%20of%20the%20student%20student%20experiment%20and%20control%20class.%20The%20description%20of%20pretest%20and%20posttest%20ability%20of%20creative%20student%20experiment%20and%20control%20class%20can%20be%20seen%20on%20the%20following%20table%202./from/en/to/hi)

**Table 2.** Descriptive Statistic

|  |  |  |
| --- | --- | --- |
| Descriptive | Experiment Class | Control Class |
| *Pretest* | *Posttest* | *Pretest* | *Posttest* |
| Average | 19,36 | 86,68 | 15,32 | 77,32 |
| Variance | 19,423 | 36,078 | 16,143 | 13,977 |
| Maximum Score Obtained | 26 | 100 | 25 | 85 |
| Ideal Maximum Score | 100 | 100 | 100 | 100 |
| Minimum Score Obtained | 11 | 76 | 10 | 70 |
| Ideal Minimum Score | 0 | 0 | 0 | 0 |
| Students | 28 | 25 |

[Pretest results of both classes indicate that students have never studied data centralized statisticality materials and that the students' early creative thinking abilities are not optimal.](http://www.u-dictionary.com/home/word/Pretest%20results%20of%20both%20classes%20indicate%20that%20students%20have%20never%20studied%20data%20centralized%20statisticality%20materials%20and%20that%20the%20students%27%20early%20creative%20thinking%20abilities%20are%20not%20optimal./from/en/to/hi)

As for the criteria of post-test creative thinking ability of students experiment and control classes can be seen on the following table 3.

**Table 3.** Post-test Result of Creative Thinking Ability

|  |  |  |
| --- | --- | --- |
| Score Interval | Criteria |  *Posttest Result*(KKM = 75) |
| Experiment Class | Control Class |
| *f* | % | *f* | % |
| $$x>90$$ | Excellent | 6 | 21,43% | 0 | 0% |
| $$75\leq x\leq 90$$ | High | 22 | 78,57% | 22 | 88% |
| $$60<x<75$$ | Medium | 0 | 0% | 3 | 12% |
| $$45<x\leq 60$$ | Low | 0 | 0% | 0 | 0% |
| $$x\leq 45$$ | Lowest | 0 | 0% | 0 | 0% |
| Students who have minimum high criteria | 28 | 100% | 22 | 88% |

[Normality tests were made to see if a sample data was taken from a normal distribution population. Normality tests were made on the results of the pretests and posttests of the experimental and control classes. The normality test hypothesis is as follows:](http://www.u-dictionary.com/home/word/Normality%20tests%20were%20made%20to%20see%20if%20a%20sample%20data%20was%20taken%20from%20a%20normal%20distribution%20population.%20Normality%20tests%20were%20made%20on%20the%20results%20of%20the%20pretests%20and%20posttests%20of%20the%20experimental%20and%20control%20classes.%20The%20normality%20test%20hypothesis%20is%20as%20follows%3A/from/en/to/hi)

H0 : sample data from a normally distributed population

H1 : sample data from a non-normally distributed population

The result of normality test analysis can be seen on the following table 4.

**Table 4.** Normality Test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Class | *p-value (sig)* | $$α$$ | Result |
| *Pretest values* | Experiment | 0,129 | 0,05 | Normal |
| Control | 0,120 | 0,05 | Normal |
| *Posttest values* | Experiment | 0,170 | 0,05 | Normal |
| Control | 0,108 | 0,05 | Normal |

[H0 denied if p-value less than 0,05. Instead, H0 is accepted if p-value (sig) is over 0,05. Based on table 4 the conclusion that pretest scores and posttest values in normally distributed experiment classes and control classes.](http://www.u-dictionary.com/home/word/H0%20denied%20p-value%20less%20than%200.05.%20Instead%2C%20h0%20is%20accepted%20if%20p-value%20%28sig%29%20is%20over%200.05.%20Based%20on%20table%204%20the%20conclusion%20that%20pretest%20scores%20and%20posttest%20values%20in%20normal%20distributed%20experiment%20classes%20and%20control%20classes./from/en/to/hi)

[The homogeneity test was used to see if a sample data was obtained from populations that were homogeneous or not. The homogenity test results from pretests and posttests of the experimental and control classes. The homogenity test hypothesis is as follows:](http://www.u-dictionary.com/home/word/The%20homogeneity%20test%20was%20used%20to%20see%20if%20a%20sample%20data%20was%20obtained%20from%20populations%20that%20were%20homogeneous%20or%20not.%20The%20homosexuality%20test%20results%20from%20pretests%20and%20posttests%20of%20the%20experimental%20and%20control%20classes.%20The%20homogenity%20test%20hypothesis%20is%20as%20follows%3A/from/en/to/hi)

H0 : sample data from the population is homogeneous

H1 : sample data from the population is not homogeneous

The result of homogeneity test analysis can be seen on the following table 5.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Data | *p-value (sig)* | α | Result |
| 1. | *Pretest values* | 0,663 | 0,05 | Homogenous |
| 2. | *Posttest values* | 0,074 | 0,05 | Homogenous |

 **Table 5.** Homogeneity Test

[H0 denied if p-value less than 0,05. Instead, H0 is accepted if p-value (sig) is over 0,05. Based on table 5 it concludes that pretest data and posttest of the students' creative thinking ability from experiment class and control classes come from homogeneous populations.](http://www.u-dictionary.com/home/word/H0%20denied%20p-value%20less%20than%200.05.%20Instead%2C%20h0%20is%20accepted%20if%20p-value%20%28sig%29%20is%20over%200.05.%20Based%20on%20table%205%20it%20concludes%20that%20pretest%20data%20and%20posttest%20of%20the%20students%27%20creative%20thinking%20ability%20from%20experiment%20class%20and%20control%20classes%20come%20from%20homogeneous%20populations./from/en/to/hi)

[This research contains three hypotheses. The first hypothesis of inquiry methods is effective on junior high school creative thinking ability at mathematical learning. The effectiveness of these learning methods is demonstrated by inquiry measures that support student creative thinking ability indicators. Additionally, the effectiveness of inquiry methods of study is also supported by the posttest scores of experimental student students.](http://www.u-dictionary.com/home/word/This%20research%20contains%20three%20hypotheses.%20The%20first%20hypothesis%20of%20incubation%20methods%20is%20effective%20against%20junior%20high%20school%20creative%20thinking%20ability%20at%20math%20study.%20The%20effectiveness%20of%20these%20learning%20methods%20is%20demonstrated%20by%20incubation%20measures%20that%20support%20student%20creative%20thinking%20ability%20indicators.%20Additionally%2C%20the%20effectiveness%20of%20incubation%20methods%20of%20study%20is%20also%20supported%20by%20the%20posttest%20scores%20of%20experimental%20student%20students./from/en/to/hi) [Based on table 3 it shows that](http://www.u-dictionary.com/home/word/Based%20on%20table%203%20it%20shows%20that/from/en/to/hi) [students have high levels of creative thinking ability](http://www.u-dictionary.com/home/word/Students%20have%20high%20levels%20of%20creative%20thinking%20ability/from/en/to/hi). [The effectiveness of inquiry learning methods is also supported by hypothetical testing.](http://www.u-dictionary.com/home/word/The%20effectiveness%20of%20incubation%20learning%20methods%20is%20also%20supported%20by%20hypothetical%20testing./from/en/to/hi) [As for the first hypothesis formulation:](http://www.u-dictionary.com/home/word/As%20for%20the%20first%20hypothesis%20formulation%3A/from/en/to/hi)

H0 : $μ\_{E2}\leq 74,9$ ([inquiry methods is not effective on the junior high student's creative thinking ability](http://www.u-dictionary.com/home/word/Incubatics%20are%20effective%20against%20the%20junior%20high%20student%27s%20creative%20thinking%20ability%20at%20math%20study/from/en/to/hi)

 at mathematical learning)

H1 : : $μ\_{E2}>74,9$ ([inquiry methods is effective on the junior high student's creative thinking ability](http://www.u-dictionary.com/home/word/Incubatics%20are%20effective%20against%20the%20junior%20high%20student%27s%20creative%20thinking%20ability%20at%20math%20study/from/en/to/hi)

 at mathematical learning)

[Significant levels used are 0,05. The decision criteria are H0 denied if its value is less than 0,05. Hypothetical testing using the data from the class posttest scores experiment with one-sample t test by SPSS 23 can be seen at table 6 as follows.](http://www.u-dictionary.com/home/word/Significant%20levels%20used%20are%200.05.%20The%20decision%20criteria%20are%20h0%20denied%20if%20its%20value%20is%20less%20than%200.05.%20Hypothetical%20testing%20using%20the%20data%20from%20the%20class%20posttest%20scores%20experiment%20with%20one-sample%20ttest%20test%2023%20can%20be%20seen%20at%20table%206%20as%20follows./from/en/to/hi)

**Table 6.** One Sample T Test for Experiment Class



[Based on a one-sample t test using a posttest value on the experimental class obtained that the significance (2-tailed) = 0,000 < α = 0.05 so H0 was rejected. Thus, it may be argued that math study uses inquiry methods effectively for the creative thinking ability of middle schoolers.](http://www.u-dictionary.com/home/word/Based%20on%20a%20one-sample%20ttest%20using%20a%20posttest%20value%20on%20the%20experimental%20class%20obtained%20that%20the%20significance%20%282-tailed%29%20%3D%200%2C000%20%3C%20/%20I%20%3E%200.05%20so%20h0%20was%20rejected.%20It%20may%20be%20argued%2C%20therefore%2C%20that%20math%20study%20USES%20incubation%20methods%20effectively%20against%20the%20creative%20thinking%20ability%20of%20middle%20schoolers./from/en/to/hi) T[his results in consistent with the research carried out by Dhiah Ika Kristiani (2013) that the use of the medium of learning by inquiry methods has a high influence on student learning achievements and student creativity.](http://www.u-dictionary.com/home/word/This%20results%20in%20consistent%20with%20the%20study%20carried%20out%20by%20the%20Christian%20dhiah%20ika%20%282013%29%20that%20the%20use%20of%20the%20medium%20of%20learning%20by%20incubation%20methods%20has%20a%20high%20influence%20on%20student%20learning%20achievements%20and%20student%20creativity./from/en/to/hi)

[The second hypothesis of a scientific approach is effective on junior high student creative thinking ability at mathematical learning. The effectiveness of this method of learning is demonstrated by the scientific approach learning measures that support students' creative thinking ability indicators.](http://www.u-dictionary.com/home/word/The%20second%20hypothesis%20of%20a%20saintifical%20approach%20is%20effective%20on%20junior%20high%20student%20creative%20thinking%20ability%20at%20math%20study.%20The%20effectiveness%20of%20this%20method%20of%20learning%20is%20demonstrated%20by%20the%20saintifical%20approach%20learning%20measures%20that%20support%20students%27%20creative%20thinking%20ability%20indicators./from/en/to/hi) [In addition, the effectiveness of learning methods with a scientific approach is also supported by the posttest control class student scores.](http://www.u-dictionary.com/home/word/In%20addition%2C%20the%20effectiveness%20of%20learning%20methods%20with%20a%20saintific%20approach%20is%20also%20supported%20by%20the%20posttest%20control%20class%20student%20scores./from/en/to/hi) [Based on table 3 it shows that](http://www.u-dictionary.com/home/word/Based%20on%20table%203%20it%20shows%20that/from/en/to/hi) 88% [students have high levels of creative thinking ability. The effectiveness of learning methods with a scientific approach is also supported by hypothetical testing. As for the second hypothesis formula:](http://www.u-dictionary.com/home/word/Students%20have%20high%20levels%20of%20creative%20thinking%20ability.%20The%20effectiveness%20of%20learning%20methods%20with%20a%20scientific%20approach%20is%20also%20supported%20by%20hypothetical%20testing.%20As%20for%20the%20second%20hypothesis%20formula%3A/from/en/to/hi)

H0 : $μ\_{K2}\leq 74,9$ (scientific approach is not effective on the junior high school student’s creative

 thinking ability at mathematical learning)

H1 : $μ\_{K2}>74,9$ (scientific approach is effective on the junior high school student’s creative

 thinking ability at mathematical learning)

[Significant levels used are 0,05. The decision criteria are H0 denied if its value is less than 0,05. Hypothetical testing using the control class posttest scores with testing one-sample t test by SPSS 23 can be seen at table 7 as follows.](http://www.u-dictionary.com/home/word/Significant%20levels%20used%20are%200.05.%20The%20decision%20criteria%20are%20h0%20denied%20if%20its%20value%20is%20less%20than%200.05.%20Hypothetical%20testing%20using%20the%20control%20class%20posttest%20scores%20with%20testing%20one-sample%20ttest%20with%20SPSS%2023%20can%20be%20seen%20at%20table%207%20as%20follows./from/en/to/hi)

**Table 7.** One Sample T Test for Control Class



[Based on a one-sample t test using a posttest value on the control class provided that its value (2-tailed) = 0,005 < α = 0,05 so H0 was rejected.](http://www.u-dictionary.com/home/word/Based%20on%20a%20one-sample%20ttest%20using%20a%20posttest%20value%20on%20the%20control%20class%20provided%20that%20its%20value%20%282-tailed%29%20%3D%200.005%20%3C%20/%20I%20%3E%200.05%20so%20h0%20was%20rejected./from/en/to/hi) [Thus, it may be argued that mathematical learning with a scientific approach is effective on junior high student creative thinking ability. The results coincided with research conducted by Tri Rokhimah (2015) that a scientific approach based on an open ended problem is effectively based on educational's creative thinking ability.](http://www.u-dictionary.com/home/word/Thus%2C%20it%20may%20be%20argued%20that%20mathematical%20learning%20with%20a%20saintifical%20approach%20is%20effective%20on%20junior%20high%20student%20creative%20thinking%20ability.%20The%20results%20coincided%20with%20research%20conducted%20by%20tri%20rokhimah%20%282015%29%20that%20a%20saintifik%20approach%20based%20on%20an%20open%20ended%20problem%20is%20effectively%20based%20on%20educational%27s%20creative%20thinking%20ability./from/en/to/hi)

[The third hypothesis of the inquiry method was more effective than the scientific approach to the creative thinking ability of a junior high student at math. Analysis has shown that math study uses both inquiry methods and effective scientific approaches to students' creative thinking ability, and it can be done later analysis to see which methods are more effective. As for the third hypothesis's formula:](http://www.u-dictionary.com/home/word/The%20third%20hypothesis%20of%20the%20incubation%20method%20was%20more%20effective%20than%20the%20saintifical%20approach%20to%20the%20creative%20thinking%20ability%20of%20a%20junior%20high%20student%20at%20math.%20Analysis%20has%20shown%20that%20math%20study%20USES%20both%20incubation%20methods%20and%20effective%20scientific%20approaches%20to%20students%27%20creative%20thinking%20ability%2C%20and%20it%20can%20be%20done%20later%20analysis%20to%20see%20which%20methods%20are%20more%20effective.%20As%20for%20the%20third%20hypothesis%27s%20formula%3A/from/en/to/hi)

H0 : $μ\_{XE}\leq μ\_{XK}$ (inquiry methods were not more effective than a scientific approach to junior high

 school creative thinking ability at math study)

H1 : $μ\_{XE}>μ\_{XK}$ (inquiry methods were more effective than a scientific approach to junior high

 school creative thinking ability at math study)

[Significant levels used are 0,05. The decision criteria are H0 denied if its value is less than 0,05. Analysis uses the average value of experimental class posttest and control classes with test independent t test by SPSS 23 can be seen at table 8 as follows.](http://www.u-dictionary.com/home/word/Significant%20levels%20used%20are%200.05.%20The%20decision%20criteria%20are%20h0%20denied%20if%20its%20value%20is%20less%20than%200.05.%20Analysis%20USES%20the%20average%20value%20of%20experimental%20class%20posttest%20and%20control%20classes%20with%20test%20independent%20ttest%2023%20can%20be%20seen%20at%20table%208%20as%20follows./from/en/to/hi)

**Table 8.** Independent-Sample T Test



[Based on the results of independent test samples t tests it was obtained that its value (2-tailed) = 0,000 < α = 0,05 so H0 was rejected. Additionally, table 3 indicates that the average number of posttest classes of experimentation was higher than the control class.](http://www.u-dictionary.com/home/word/Based%20on%20the%20results%20of%20independent%20test%20samples%20t%20tests%20it%20was%20obtained%20that%20its%20value%20%282-tailed%29%20%3D%200%2C000%20%3C%20/%20I%20%3E%200.05%20so%20h0%20was%20rejected.%20Additionally%2C%20chart%203%20indicates%20that%20the%20average%20number%20of%20posttest%20classes%20of%20experimentation%20was%20higher%20than%20the%20control%20class./from/en/to/hi) [Thus, it may be concluded that mathematical learning employs inquiry methods more effectively than a scientific approach to the creative thinking ability of junior high school students.](http://www.u-dictionary.com/home/word/Thus%2C%20it%20may%20be%20concluded%20that%20math%20study%20employs%20incubation%20methods%20more%20effectively%20than%20a%20saintifical%20approach%20to%20the%20creative%20thinking%20ability%20of%20junior%20high%20school%20students./from/en/to/hi) [This result is consistent with research by Rizki Dwi Siswanto (2015) that increasing the creative thinking ability of the students who acquire inquiry studies is better than geogebra assistance than students who obtain conventional learning.](http://www.u-dictionary.com/home/word/This%20result%20is%20consistent%20with%20research%20by%20rizki%20dwi%20siswanto%20%282015%29%20that%20increasing%20the%20creative%20thinking%20ability%20of%20the%20students%20who%20acquire%20incubation%20studies%20is%20better%20than%20geogebra%20assistance%20than%20students%20who%20obtain%20conventional%20learning./from/en/to/hi)

1. Conclusions and Suggestions
	1. *Conclusions*

[Based on research](http://www.u-dictionary.com/home/word/Based%20on%20the%20results%20of%20the%20research%20and%20the%20discussions%20that%20have%20been%20explained%2C%20they%20come%20to%20the%20conclusions%20as%20follows./from/en/to/hi) results and the discussions that have been explained, the conclusion has come to be that the use of inquiry methods and scientific approach are effective for junior high student creative thinking ability on mathematical learning, and the use of inquiry methods is more effective than a scientific approach to the creative thinking ability of junior high students on mathematical learning.

* 1. *Suggestions*

[Based on the conclusions drawn, there are several suggestions that can be taken into consideration](http://www.u-dictionary.com/home/word/Based%20on%20the%20conclusions%20drawn%2C%20there%20are%20several%20Suggestions%20that%20can%20be%20taken%20into%20account%20as%20follows./from/en/to/hi), when the teacher gives material to students, the teacher may use the inquiry method as an alternative to facilitating the student’s ability to optimize creative thinking ability. [If the teacher wants to implement an inquiry method, then the teacher must take note of the complexity of the material.](http://www.u-dictionary.com/home/word/If%20the%20teacher%20wants%20to%20implement%20an%20incubation%20method%2C%20then%20the%20teacher%20must%20take%20note%20of%20the%20complexity%20of%20the%20material./from/en/to/hi)

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