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<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training and Guidance Using SPSS for Teachers’ Research Data Processing Applications at Kecamatan Tanggetada, Kolaka Southeast Sulawesi</td>
<td>1-6</td>
</tr>
<tr>
<td>Rustam, Ahmad &amp; Mashuri, Sufri</td>
<td></td>
</tr>
<tr>
<td>Improving the Results of Math Learning through Scramble Cooperative Model with the Approach of Contextual Teaching and Learning Model</td>
<td>7-14</td>
</tr>
<tr>
<td>Rustam, Ahmad &amp; Adli, Muhammad</td>
<td></td>
</tr>
<tr>
<td>The Effect of Application of Problem Based Learning against Proportional Reasoning Ability Based on Vocational Students’ Achievement Motivation</td>
<td>15-21</td>
</tr>
<tr>
<td>Hali, Fitriyani</td>
<td></td>
</tr>
<tr>
<td>The Improvement of Mathematics Communication for Junior High School Students through Contextual Mathematics Learning</td>
<td>22-26</td>
</tr>
<tr>
<td>Herlina</td>
<td></td>
</tr>
<tr>
<td>Effect of Students’ Learning Interests, Attitudes, and Perception about Teacher’s Teaching Technique toward Math Learning Outcomes in Class VIII SMP Negeri in the District Bulukumba</td>
<td>27-32</td>
</tr>
<tr>
<td>Erviana, Lilis</td>
<td></td>
</tr>
<tr>
<td>The Effect of Attitude and Spiritual Intelligence towards Math Achievement of Class XI MAN Kolaka</td>
<td>33-39</td>
</tr>
<tr>
<td>Rustam</td>
<td></td>
</tr>
<tr>
<td>The Effect of the Classroom Climate, Students' Attitudes, and Perceptions on Math toward the Association Material Learning Outcomes through Students' Motivation of Class VII SMP in the District of Kolaka</td>
<td>40-46</td>
</tr>
<tr>
<td>Subawo, Made</td>
<td></td>
</tr>
<tr>
<td>Comparative Study of the Students’ Math Learning Outcomes Taught Using Type of Cooperative Learning Method <em>Numbered Head Together</em> (NHT) and <em>Games Team Tournament</em> (TGT) to Students Class VII SMPN 1Baula</td>
<td>47-55</td>
</tr>
<tr>
<td>Supratman</td>
<td></td>
</tr>
<tr>
<td>The Enhancement of Mathematical Critical Thinking Skills and Self-Efficacy at Senior High School Students through Learning- Based Problems Contextual Model</td>
<td>56-62</td>
</tr>
<tr>
<td>Listiani, Waode</td>
<td></td>
</tr>
<tr>
<td>The Effect of Van Hiele Learning Model toward Geometric Reasoning Ability Based on Self-Efficacy of Senior High School Students</td>
<td>63-72</td>
</tr>
<tr>
<td>Ramlan, Andi Mariani</td>
<td></td>
</tr>
</tbody>
</table>
TRAINING AND GUIDANCE USING SPSS FOR TEACHERS' RESEARCH DATA PROCESSING APPLICATIONS AT KECAMATAN TANGGETADA, KOLAKA SOUTHEAST SULAWESI

Abstract

This devotion is aimed to improve the ability of teachers to process research data using SPSS. Things that the background is the lack of the use and knowledge of teachers in the use of SPSS and research works of teachers is lacking, one possible cause is the inability of teachers in data processing, especially using SPSS. This devotion includes four phases, namely, preparation, determination of the participants, the training and guidance of the use of SPSS, and direct practice of use of each of the steps in the data analysis in SPSS. The methods used include lectures and question and answer, targeted discussion groups, guidance and simulation data analysis, and direct practice with SPSS data analysis, and administration tasks. Outputs produced is yielding clues analysis work program SPSS for teachers and guidance techniques and operation of SPSS in data processing as well as the need to retrieve accurate results and capable operation of SPSS in data processing based on the instructions of work to be able to determine the valid data instrument and obtain accurate results.

Keywords: application, SPSS, research data

A. Introduction

In accordance with the mandate contained in the Act of Teachers and Lecturers (2005) in the academic field is that teacher education qualifications required diploma level or S1. It is intended that they have professional skills in order to improve the quality of education in Indonesia. The teachers' minimum requirements are diploma level, that is expected to be not only capable of teaching and learning in the classroom, but they are expected to do research for the improvement of the learning process that they do on an ongoing basis.

Accordingly, in accordance with the limited observations were carried out in schools teachers in mind that one of their drawbacks is the lack of work in the field of scientific work and research which caused one of them is unskilled teachers in data processing, especially using the help of applications that can facilitate them. This shows that one of the weak points owned by the teachers to be addressed. Weaknesses possessed by the teachers, based on the limited
observations, apparently also experienced by teachers, especially teachers of junior high school at Kecamatan Tanggetada, which is in Kolaka.

Kecamatan Tanggetada is one District in Kolaka that most residential and educational institutions located near the beach, a result of the location is quite far from the city center districts that have not been reached by the activity of devotion, especially in the fields of research, from universities in Kolaka, namely University Kolaka November nineteen. Therefore, our teams of Service Department of Mathematics Education, Guidance and Counseling, University of Sembilanbelas November Kolaka intend to do community service for teachers at Kecamatan junior Tanggetada in the form of training and guidance of the use of SPSS for data processing research conducted by teachers. The goal is to help teachers who have one of the difficulties in conducting research, especially in the processing of data that impede their research to finish which is one of the professional duties of teachers as educators, as has been mentioned earlier. It could be said that with the holding of the training and guidance of the use of SPSS for research data processing is expected to strongly support the junior high school teachers at Kecamatan Tanggetada in developing academic competencies in a sustainable manner.

In accordance with the previous explanation, that since the enactment of the Law on Teachers and Lecturers, every teacher is no exception teachers in junior high school Kecamatan Tanggetada Kabupaten Kolaka, required to become professional teachers. A professional teacher said was marked by evidence that teachers have passed the certification. The problem is on the one hand the teachers need to pass the certification with one of the requirements is the teachers need to show proof that they are able to conduct research and produce work in addition to learning a routine at school, on the other hand are generally teachers are still difficulties and need guidance in conducting independent research in particular processing the data they have acquired, such as in the form of experimental research. This is a serious problem often faced by teachers of junior high schools at Kecamatan Tanggetada.

Meanwhile, most of the activities of the teacher merely discuss matters of administrative such as discussion of making lesson plans and discussion the creation of standard tests or general tests, however, less in terms of the discussion of the research problem. There are several factors as the cause. One of them is the lack of teachers or experts who can build research capacity, particularly in research experiments. So teachers are less able to do research particularly for data processing for experimental research.

The expected outcomes of Community Service activities are as follows:
1. Generating work instructions for SPSS analysis program for teachers
2. Technical guidance and operation of SPSS in data processing so that they can determine the data valid instrument as well as the need to retrieve accurate results.
   Able to operate SPSS in data processing based on the instructions of work to be able to determine the instrument data is valid and accurate results.

B. Literature Review

Technological developments now require researchers to be active in updating the latest information. It is intended that the rate of development of future research will be more qualified and more complex. One of the current technological developments is SPSS (Statistical Program for Social Science) as a computer-based analysis tools. According to Razak (2010: 1) SPSS statistical software is one of the first made in 1968 by three students of Stanford University, the Norman H. Nie, C. Hadlai Hull and Dale H. Bent.

The use of SPSS in various fields of research are numerous, so the latest versions of several publications continue to do until now IBM SPSS V.21. According Sebayang (2005: 1) SPSS is a package program that is useful to analyze statistical data and SPSS is used for almost all data files and also create reports either in the form of tabulations, graphs, and plots for various distributions and descriptive statistics.

Data is information that can be used to resolve and solve a problem. Here are some expert opinions understanding of the data in Bobsusanto (015:1):
1. Slamet Riyadi; explains that the data is aggregated information obtained from observations where data can include numbers or symbols.
2. Zulkifli A.M; expresses the data is information, evidence or facts about a reality that is still raw (original) and unprocessed.
3. Haer Talib; is a set of data to explain the fact that no other event or fact.
4. Arikunto; according to the data is all the facts and figures that can be used as material to construct information.
5. Kris; explains the data is a fact about the object to reduce the degree of uncertainty about a situation or event.
6. Supriyanto & Ahmad Muhsin; suggest the data is the raw material of the information or symbols that represent quantities, facts, actions, objects, and so forth.
7. Lia Kuswayatno; explains the data as an event that actually happened in real life.

C. Methodology

The method will be used in training and mentoring the use of SPSS for data processing teacher research is as follows. (1) lectured and asked questions about the steps in the analysis of data in SPSS, (2) Focused Group Discussion on measures in the analysis of data in SPSS, (3) guidance and simulation of any steps in analyzing data on SPSS application, (4) the practice of direct use of each of the steps in the analysis of data in SPSS, (5) the provision of duty-related research data analysis using SPSS application.

The procedure of activities in the training and guidance of the use of SPSS for data processing research are as follows. (1) the general approach, (2) the determination of the participants in the training and guidance of the use of SPSS for data processing for teachers’ research, (3) the type, data collection procedures, and (4) scale activities.

1. General approach

This activity is a training / workshop, which aims to provide the knowledge, understanding and skills to participants / partners through (1) a lecture and asked questions about the steps in the analysis of data in SPSS, (2) Focused Group discussion on measures in the analysis of the data in SPSS, (3) guidance and simulation of any steps in analyzing the data in SPSS, (4) the practice of direct use of each of the steps in the analysis of data in SPSS, (5) the provision of duty-related research data analysis using SPSS application.

2. Determination of the Participants

Determination of trainees and the guidance of the use of SPSS for processing research data were conducted by purposive sampling method. According Sugiyono (2012: 126) purposive sampling technique with particular consideration, then this service directly appoint two junior high schools at Kecamatan Tanggetada by various considerations, type, and procedure.

3. Data Collection

Primary data in this study was data taken from observations and in-depth interviews of 20 junior high school teachers.

4. Event Scale

These social service activities cover all teachers of junior high school at Kecamatan Tanggetada selected.

D. Finding and Discussion

Science and technology program for the Society entitled "Training and Guidance Using SPSS for Research Data Processing Applications for Junior School Teachers at Kecamatan Tanggetada Kolaka Southeast Sulawesi province" has been going well. The training was attended by 24 teachers in July 2015. The results obtained are:

Participants have been able to:

a) understand some types of research data,
b) understand the analysis used any kind of data and research issues,
c) using SPSS SPSS v.20 applications to analyze the data of a study.

The stages of training and mentoring the use of SPSS includes the step; (A) the preparation, dissemination to the SMP, (b) training and guidance for the application of the use of research data processing, (c) the direct practice of use of each of the steps in the data analysis in SPSS.

a. Preparation phase

This social service activity was conducted in January-February 2015. This activity aimed to promote of activities other than devotion to implementing unit training and mentoring activities at Kecamatan Tanggetada and also aimed to explore the needs of teachers at Kecamatan Tanggetada. The stages of preparation in training and mentoring the use of SPSS for data processing research junior high school teachers at Kecamatan Tanggetada Southeast Sulawesi Kolaka. The activities included the following steps.

1) Choosing the learning materials to be covered

Selection of material was done to adjust the needs of teachers. This was done, because research analysis study was so comprehensive, so things were needed and easily understood by teachers can be implemented effectively
2) Determining the statistical analysis

After the selection of training materials, subsequently determine the analysis that will be used and discussed using SPSS application. One example of a comparison tests on average, according to Sujarweni (2015: 97) comparative test sample average free using two independent samples t test. Likewise with correlation and regression will be explained on the steps of this training guidance. This is done in order to be trained to work well with measures of statistical analysis that has been determined.

3) Arranging work instructions for SPSS

After the determination of the material and analysis based on some literature that will be used in training then prepared a manual labor statistical analysis using SPSS. This was done to facilitate the participants in following the guidance process with various measures analysis of SPSS applications.

4) Dividing groups

The group division was made to facilitate the coach at the time of delivery of materials and the provision of training, so that participants can become more capable tutor for the participant group. It was, in accordance with the opinion of Hartono (2013: 101) learning mutual cooperation (Cooperative Learning) is a form of teaching that divides several groups that cooperate with one another to solve the students' problems.

b. Training and guidance for the use of SPSS for data processing research

The stages of training in the training and guidance of the use of SPSS for data processing research junior high school teachers at Kecamatan Tanggetada, Kolaka Southeast Sulawesi Province includes the following activities; (1) identifying research data, (2) make research data, (3) determining the data analysis, (4) guide and train to operate SPSS. Description of each stage of the exercise is as follows.

1) Getting to Know the Research Data

This section, the first participants were introduced to various types of data. This was done so that teachers know the type of data to be processed and then be able to determine the type of precise analysis if the data type is already known.

a. Data by Source

Data were divided into two by the source, is as follows:

1. Primary data is data obtained or collected by researchers directly from the data source. Primary data is also known as the original data or new data that has properties up to date. In order to obtain primary data, researchers must collect it directly. The technique can be used researchers to collect primary data observation, interviews, discussions focused (focus group discussion - FGD) and questionnaires.

2. Secondary data is data obtained or collected researchers from a variety of sources that already exist (researchers as second hand). Secondary data can be obtained from various sources such as the Central Bureau of Statistics (BPS), books, reports, journals, and others.

Understanding these two types of data above are needed as a basis in determining the techniques and steps of research data collection.

b. Nature-Based data

Data based on the form and its nature then it can be divided into two types of qualitative data (in the form of words/phrases). The qualitative data was obtained through a variety of data collection techniques e.g. interviews, document analysis, focus group discussions, or observations that have been outlined in court records (transcripts). Another form of qualitative data is obtained through shooting pictures or video footage. Quantitative data can be grouped based on the way to get that data is discrete and continuum of data. By its nature, the quantitative data consists of data is nominal, ordinal data, the data interval and ratio data.

c. Data Completely

Riduwan (2010: 81) based on the level of measurement used, quantitative data can be classified into four types (levels) which have different properties, namely nominal, ordinal, interval and ratio. The following explanation:

1. Nominal data or often referred to as category data is data obtained by grouping objects based on specific categories. Examples of nominal data, among others: Gender consisting of two categories:
(1) Men  
(2) Women  
Figures (1) for males and figure (2) for women is only a symbol that is used to distinguish between the two categories of sex.

2. Ordinal data is the data that comes from an object or a category that has been prepared in stages according to the size. Each has a certain level ordinal data that can be ordered from lowest to highest or vice versa. Examples of ordinal data types include: The level of education is structured in the following order:  
(1) Kindergarten (TK)  
(2) Elementary School (SD)  
(3) Junior High School (SMP)  
(4) High School (SMA)  
(5) Diploma  
(6) Degree

3. Interval Data is the measurement data that can be sorted on the basis of certain criteria and show all the properties owned by ordinal data. Examples of interval data, among others:  
1) intellectual Intelligence expressed in IQ. IQ range of 100 to 110 have the same distance to 110 to 120. However, not otherwise people who have IQ 150 intelligence level 1.5 times of one who has an IQ of 100.  
2) Based on the strong assumption, learning achievement test scores (e.g. GPA student and student test results) can be regarded as interval data.

4. Ratio data is the data that collects all the properties owned by the nominal data, ordinal data and interval data. Ratio data is data that shaped figure in the real sense because it is equipped with the absolute zero point (absolute) so that the applicability of all forms of mathematical operations (+, -, x, :). examples of the types of data the ratio, among others:  
The length of an object that is expressed in the size of the meter is the ratio data. The object of length 1 meter differs significantly with body length of 2 meters so that it can be made a category objects that are 1 meter and 2 meter (nominal data properties). Length of objects can be ordered from longest to shortest (ordinal data properties). The difference between the object of length 1 meter by 2 meters at a distance equal to the difference between objects that length of 2 meters by 3 (the nature of interval data). Excess properties owned ratio data is indicated by the two things: (1) The number 0 meter indicates absolute value, which means that none of the measure; and (2) The object of 2 meters in length, 2 times longer than the body length of 1 meter which indicates the enactment of all the mathematical operations. Secondly it is not applicable to the type of nominal data, ordinal data, or interval data.

1) Making research data  
The researches data are often used in educational research concerning with learning outcomes that are manifold interval data and the data is processed using parametric statistics. These section was enthusiastic for teachers to make research data by taking the values of student learning outcomes in class.

2) Determine the data analysis  
Analysis of the data was discussed in community service that was descriptive statistical analysis and inferential statistics. Data analysis for descriptive statistics in the form of centralizing data analysis consisted of mean, median, mode, standard deviation, variance, etc. were processed using SPSS. Data analysis consisted of inferential statistical test of one sample t test, paired sample t test, independent sample t test, ANOVA, further different test, correlation, and regression.

3) Guiding and trained to operate SPSS  
At this stage the data that has been created and specified analysis will subsequently analyzed using SPSS v.20 later, the results of SPSS will be analyzed according to the data in the input. Training measures data processing using SPSS v.20 described fully in the work manual analysis of SPSS as one outcome in this devotion.
E. Conclusion

Stages of training and guidance include the following: (1) identifying research data, (2) make research data, (3) determining the data analysis, (4) guide and train to operate SPSS. Based on that stage participants have been able to:
- understanding some of the types of research data,
- understanding the analysis used any kind of data and research issues, and
- using SPSS v.20 applications to analyze the data of a study.

References


IMPROVING THE RESULTS OF MATH LEARNING THROUGH SCRAMBLE COOPERATIVE MODEL WITH THE APPROACH OF CONTEXTUAL TEACHING AND LEARNING MODEL

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Abstract

This research is motivated by the desire of the author to enhance students' skills and learning design that is not centered on the teacher. Thus, this study aims to improve students’ mathematics learning outcomes through Scramble Cooperative Learning Model with Contextual Teaching and Learning (CTL) Approach at the class VIIIB SMP Negeri 1 Latambaga. The study was conducted on 28 April 2015 s / d dated May 28, 2015. The subject of this research is class student of SMP Negeri 1 Latambaga VIIIB. This research is a Classroom Action Research conducted in two cycles with study procedures: (a) Conducting planning to implement the learning process, (b) Implement the action in accordance with the plan, (c) Conducting observations of students and teachers during the process of the action takes place, (d) Conducting evaluations / tests to students in each end of the cycle, (e) to reflect and analyze the shortcomings and weaknesses during the first cycle for the plan of action on the second cycle. The results obtained are in action first cycle, the learning outcomes of students increased from an average score of initial tests before action is 68.25 into 77.71 or 78.12% with the percentage of completeness that 25 of the 32 students received grades ≥75, it this has not shown success according to defined indicators of success. In the second cycle of the results obtained are as many as 27 students get value ≥75 with an average value of 83.15 or with a percentage of 84.37%. This means that the results of the research for cycle I and cycle II. It can be concluded that the results students grade VIIIB of SMP Negeri 1 Latambaga on material geometry through cooperative learning model scramble with CTL approach that took effect on improvement of learning outcomes.

Keywords: Math Learning Outcomes, Cooperative Learning Model Scramble approach Contextual Teaching and Learning (CTL).

A. Introduction

Education is one of the things that should be put forward for every citizen who wants progress of his people, because the science education can be developed. Besides, education geared towards the creation of quality human resources. This indicates that human resources become very dominant in the learning process, it also means that managing human resources is a very important area to implement the learning process in schools.

Mathematics is the science that aims to educate children to think logically, critically, systematically, has the objective nature, honest, disciplined in solving the problems of everyday
life both in the field of mathematics and other fields of study, so it is important mathematics is taught. But the reality on the ground, learning of mathematics is not as expected. A lot of the background factors of the case, including the lack of involvement of the student in the learning of mathematics and the use of the methods in learning.

Learning activities should be able to provide and encourage the widest possible choice of approaches liveliness inaccuracies or learning strategy is very possible involvement of the student becomes not flourish, even be it loses its activity. Furthermore, the level of activity of students in a learning process also is a measure of the quality of learning itself. The success of a teacher will be assured, if the teacher was able to take his students to understand the problem through all stages of the learning process, because that way the student will understand the things that are taught. Thus, in the teachers’ learning process should be able to use the models and teaching approaches that can guarantee successful learning as has been planned.

Based on observations of mathematics learning in junior class VIIIB Negeri1 Latambaga by the number of students 32 people on Monday, 27 April 2015 found five gaps, namely: (1) Students are rarely asked the teacher about the subject matter that has been submitted by teachers. (2) Students are reluctant to work on the problems on the blackboard. Students want to work on the problems on the board only when designated by the teacher. (3) Students are rarely raised the idea or ideas. (4) Cooperation in solving exercises students are lacking. (5) Most of the students there were bantering and less attention to the teacher’s explanation. Gaps found in class VIIIB caused namely: (1) Students are embarrassed to ask questions and do not understand the material presented by the teacher. (2) Learning strategies used are conventional and students feel fear either to work on the problems on the board. (3) Teachers rarely use learning strategies that encourage students to develop the mindset and express ideas. (4) The students prefer to work on the problems individually. (5) The strategy used by teachers tends to be monotonous and less innovative.

Sutikno (2009: 8) suggests there are several factors that affect the learning process, both factors that come from within the individual learning (internal) as well as factors that come from outside (external) or it could be a combination of both factors. Elucidations of these factors are the following:

1. Factor of the individual (internal)

Factors that come from within the individual (internal factors) are classified into 2 of the physical or physiological factors greatly influence the process and the learning achievement of children. Which includes physical factors are factors of health and disability factors. In addition, psychological factors that can affect students' learning process must be considered. These factors include: intelligence, motives, interests, emotions, talents, maturity, and readiness.

2. External Factors

The success of learning is also strongly influenced by factors outside the student (external factors). The external factors that affect the learning process can be classified into three namely: family factors, school factors, and community factors.

Based on data from test results semester of the year 2014-2015 were obtained from the curriculum of SMP Negeri 1 Latambaga. The information was dealing with the math learning outcomes of class VIIIB. In the subject matter prior to implementation of the study (pre-cycle), where the number of students who achieve the level of mastery learning only 53% of 32 people, considering the high value of KKM in SMP Negeri 1 Latambaga of 75 as determined by the school so as to have mathematical achievement is unsatisfactory.

Based on the results of these observations, the researchers tried to apply an alternative action that form the application of learning models that prefer the liveliness of the students, giving students the chance to develop the potential and creativity to the maximum, as well as providing great opportunities for students to work together among the other student with the other students. One of the learning models used is a model of cooperative learning approach Scramble mode Contextual Teaching and Learning (CTL).

As noted by Taylor in Huda (2013: 303) states that, Scramble is one model of learning that can improve students’ concentration and speed of thought. In line with the issues raised in the school SMP Negeri 1 Latambaga writer tries to do research to find solutions to the problems that have been raised previously by the model of Cooperative Learning Type Scramble approach Contextual Teaching and Learning (CTL) that is expected to improve the learning of
mathematics and further improve learning outcomes and learning is not only centered on the teacher, but the students can be more active.

Based on the explanation or clarification of the author, it was motivated to carry out action research by combining models and learning approaches that are expected to improve learning outcomes in the classroom. So the authors raised the title of the study.

B. Literature Review

Winkel (1987: 77) states that the learning outcomes are intellectual abilities that have become private property that allows that person to do something or leave a particular achievement.

One of the outcomes of learning is mastery learning materials or so-called achievements. It is the result of an activity that has been done, created either individually, in pairs or in groups. Many activities are usually used as a target to get an achievement. Based on these achievements need to be developed in a group learning one such learning is cooperative learning. Hartono (2013: 101) states cooperative learning or (in Bahasa; gotong-royong, ed) is a form of teaching that divides students into groups that cooperate with one another to solve the students' problems. Cooperative learning is a learning approach that focuses on the use of small groups of students to work together to maximize the learning conditions for achieving the learning objectives.

There are five elements that must be applied to achieve maximum results in cooperative learning: (a) positive interdependence; (B) individual responsibility; (C) face to face; (D) communication among members; (E) the evaluation process groups (Lie, 2005: 31). There are many types of cooperative learning one of them is Scramble is a method of teaching by distributing a booklet and answer sheet accompanied by alternative answers provided. Students are expected to seek the answer and the solution to a problem that exists. Widodo (2009: 1). Scramble is one type of cooperative learning that is presented in the form of a card as follows:

1. The teacher presents the material according to the basic competence to be achieved.
2. Distributing student worksheet (LKS).

Scramble type of cooperative learning was developed and accompanied by LKS. It would be more meaningful when LKS developed associated environmental problems of students. According to Kunadar (2007: 17) contextual learning is a teaching that allows students strengthen, expand, and apply knowledge and skills in a variety of school settings and out of school to solve the whole problem that exists in the real world.

Mulyasa (Hartono, 2013: 83) Contextual Teaching and Learning is a learning concept that emphasizes the link between the worlds of learning materials to learners in real life, so that learners are able to connect and apply the competencies of learning outcomes in everyday life.

C. Methodology

1. Types of Research
   This study is a class action (Classroom Action Research). Classroom action research is action research done in class by having a repeating cycle.
2. Time and Place of Research
   This research has been carried out on April 28, s / d May 28, 2015 the second semester of academic year 2014/2015 in class VIIIB SMP Negeri 1 Latambaga.
3. Subject of Research
   Subjects in this study were students VIIIB SMP Negeri 1 Latambaga the academic year 2014/2015, which consisted of 32 male students.
4. Research Instruments
   This study uses two types of data collection instruments are: the observation sheet and achievement test.
5. The procedure of Research
   The procedure of classroom action research is planned in cycles, with each cycle carried out in accordance with the change to be achieved on the factors investigated. The procedures of this study are as follows:
   a. Planning
   b. Implementation of Actions
   c. Observation and Evaluation
d. Reflection.

This study was designed based on the Lewin’s model. Chart of design of this study are as follows:

![Diagram of Classroom Action Research (CAR)](image)

5. Technique of Data Collection
   1. Data collection techniques needed in this research are:
      Data concerning activity of students in the learning process, the data obtained from observations during the learning process takes place through cooperative learning model of Scramble mode with Contextual Teaching and Learning (CTL) approach using observation sheet of students and teachers.
   2. Data on students’ mathematics learning outcomes through tests taken by the students’ learning outcomes.

6. Technique of Data Analysis
   Data obtained from this study were analyzed using descriptive quantitative analysis; the analysis is based on the percentage of student learning outcomes. Whereas qualitative descriptive analysis, namely, analysis of data obtained from the observation of the activities of teachers and students’ activity, then calculated the percentage and converted into the qualification as well as for student learning outcomes assessment criteria shown in the following table:

<p>| Table 1. Qualification Assessment Activities for Teacher and Students |
|------------------------|-------------------|</p>
<table>
<thead>
<tr>
<th>No</th>
<th>Percentage %</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>86-100</td>
<td>Very Good</td>
</tr>
<tr>
<td></td>
<td>76-85</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>66-75</td>
<td>Enough</td>
</tr>
<tr>
<td></td>
<td>56-65</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>≤ 55</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

<p>| Table 2. Student Learning Outcomes Assessment Criteria |
|------------------------|-------------------|</p>
<table>
<thead>
<tr>
<th>No</th>
<th>Interval</th>
<th>Increased Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>90 – 100</td>
<td>Veri High</td>
</tr>
<tr>
<td>2.</td>
<td>80 – 89</td>
<td>High</td>
</tr>
</tbody>
</table>
D. Finding and Discussion

1. Findings

The resulting increase in mathematics learning outcomes through cooperative learning model of Scramble mode with Contextual Teaching and Learning (CTL) approach students in cycle 1 and 2 that is shown in Table 3 and Table 4.

Table 3. Improved Learning Outcomes Mathematics in Cycle 1

<table>
<thead>
<tr>
<th>No</th>
<th>Obtained Value</th>
<th>Number of Students (Frequency)</th>
<th>Percentage</th>
<th>Value Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90 – 100</td>
<td>5</td>
<td>15,62%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>80 – 89</td>
<td>11</td>
<td>34,37%</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>65 – 79</td>
<td>11</td>
<td>34,37%</td>
<td>Enough</td>
</tr>
<tr>
<td>4</td>
<td>55 – 64</td>
<td>3</td>
<td>9,37%</td>
<td>Poor</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 54</td>
<td>2</td>
<td>6,25%</td>
<td>Very Poor</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>32</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Mean 77,71
Standard of Deviation 13,20%

Based on the table 3, it can be seen that there are 5 students get value of 90-100 (15.62%), 11 students scored at 80-89 (37.37%), 11 students scored at 65-79 (34.37%), and 3 students scored at 55-64 (9.37%), and 2 students scored at <54 (6.25%). At this stage, the overall percentage of the implementation of the first cycle is 78.12%.

Table 4. Improved Learning Outcomes Mathematics in Cycle 2

<table>
<thead>
<tr>
<th>No</th>
<th>Obtained Score</th>
<th>Number of Students (Frequency)</th>
<th>Percentage</th>
<th>Value Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90 – 100</td>
<td>9</td>
<td>28,12%</td>
<td>Very Good</td>
</tr>
<tr>
<td>2</td>
<td>80 – 89</td>
<td>13</td>
<td>40,62 %</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>65 – 79</td>
<td>8</td>
<td>25 %</td>
<td>Enough</td>
</tr>
<tr>
<td>4</td>
<td>55 – 64</td>
<td>-</td>
<td>0 %</td>
<td>Poor</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 54</td>
<td>2</td>
<td>6,25 %</td>
<td>Very Poor</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>32</td>
<td>100 %</td>
<td></td>
</tr>
</tbody>
</table>

Mean 83,15
Standard of Deviation 12,30%

Table 4. Based on these, it can be seen that there are 9 students get value of 90-100 (28.12%), 13 students scored at 80-89 (40.62%), 8 students scored at 65-79 (25%), and 2 students scored at <54 (6.25%). At this stage, the overall percentage of the implementation of the second cycle is 84.37%. Based on the analysis of students’ mathematics learning outcome, it can describe the mastery of mathematics learning results from the initial test that is shown in Table 5.

Table 5. The completeness of results of Math Learning Grade VIII B of SMP Negeri 1 Latambaga

<table>
<thead>
<tr>
<th>Description</th>
<th>Pre-test</th>
<th>Cycle 1</th>
<th>Cycle 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>68,25</td>
<td>77,71</td>
<td>83,15</td>
</tr>
</tbody>
</table>
Table 5 shows that the value of the classical mastery learning at pretests of 46.87% with an average of 68.25. In the first cycle of 78.12% with an average of 77.71, the second cycle of 84.37% with an average of 83.15. Furthermore, the average completeness student learning outcomes in pretests to the first cycle increased 9.46. In the first cycle to the second cycle increased 5.44. So it can be concluded that improvement of student learning outcomes from pretests to the second cycle is at 14.9. While for the completeness in the classical student learning outcomes in pretest to the second cycle can be seen in the following figure:

![Graph showing improvements in classical learning outcomes](image)

Figure 2 shows that the completeness of student learning outcomes in the classical style in pretest to the first cycle increased by 31.25%. In the first cycle to the second cycle increased 6.25%. So it can be concluded that improvement of student learning outcomes in the classical style of pretest to the second cycle of 37.5%.

Based on these descriptions, can be concluded that by using model Cooperative Learning of Scramble Type of Contextual Teaching and Learning (CTL) approach can improve students’ learning outcomes, although not very satisfactory, but it is considered good enough for higher than before using the Cooperative Learning model of Type Scramble of Contextual Teaching and Learning (CTL) approach.

The performance indicators in this study have been achieved due to (1) observations of teachers and students has increased or improved each meeting, and (2) the value of the evaluation results in the classical also increased after the implementation of the model of Cooperative Learning Type Scramble of Contextual Teaching and Learning (CTL) approach in two cycles.

Thus, the answer to the problems of this research has revealed that using cooperative learning model Scramble mode approach Contextual Teaching and Learning (CTL) can improve learning outcomes and the ability VIIIB grade students of SMP Negeri 1 Latambaga.

### 2. Discussion

This study was successfully after the implementation of the second cycle having reached the predetermined performance indicators. In preliminary tests, 15 students received grades ≥ 75 and 17 students still take into the value of <75 or classically 46.87% of students do not reach KKM with an average value of 68.25. In the first cycle, students who received grades ≥ 75 is 25 people or classical learning completeness 78.12% with an average value of 77.71. In the first cycle can be said to have increased when compared to the results of the student prior to the action with an increase of 31.25%. The low value of students on initial tests and the first cycle because students are still less familiar grouped and less familiar with the explanation of the teacher but did not dare to ask and many students are paying less attention to the teacher’s explanation, and there are still some students was still splashing-joke with friends. Because the learning outcomes do not meet the performance indicators established in the classical mastery learning which at least 80%, the study continued in the second cycle.

After the second cycle, the acquisition of student scores increased by an average value was 83.15 with classical learning completeness 84.37%, while the first cycle of students
are only able to obtain an average value is 77.71 with 78.12% classical completeness. This means an increase of 6.25% on the completeness study. From the 32 students, 27 students who took the test scored at ≥75 evaluation. Based on observation and evaluation, the research was stopped in the second cycle, as indicators of the success of this research has been reached with the achievement of the performance indicators of ≥ 80% in this study is 84.37%, meaning researchers have reached the destination. The results are consistent with research (Handini: 2012) which concludes that by applying the model of cooperative learning Scramble mode can improve learning activities and student learning outcomes by 77.41%. (Fitriany: 2013) concluded that the learning approach Contextual Teaching and Learning (CTL) can improve student learning outcomes 80%. Furthermore, the opinion supported Johnson (2012: 62). That by learning Contextual Teaching and Learning (CTL) succeeded because the system is asking students to act in a natural way. How it fits with the function of the brain, basic human psychology, and the three principles of the universe discovered by modern physicists and biologists. These principles are interdependent, different, and self-regulated. Based on the description, it can be concluded that through a cooperative learning model Scramble type of Contextual Teaching and Learning (CTL) approach can improve students' learning outcomes at class VIIIB of SMP Negeri 1 Latambaga.

3. Conclusion
Based on the results of research and discussion, it can be concluded that with the implementation of the model of Cooperative Learning type Scramble invitation of Contextual Teaching and Learning (CTL) approach, can improve student learning outcomes in mathematics, especially on basic competence calculate surface area and volume of cubes and blocks graders VIIIB SMP Negeri 1 Latambaga learning year 2014/2015. This is indicated by the value after the first cycle measures increased compared with the initial 68.25 into 77.71. But this has not reached the predetermined performance indicators. Furthermore, the average value of students after the second cycle of increase compared with the value of the average student on the implementation of the first cycle that action be 83.15 and 77.71 have fulfilled predetermined performance indicators that more than 80% of students have scored at least 75.

References


THE EFFECT OF APPLICATION OF PROBLEM BASED LEARNING AGAINST PROPORTIONAL REASONING ABILITY BASED ON VOCATIONAL STUDENTS‘ ACHIEVEMENT MOTIVATION

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Abstract
Proportional reasoning abilities of students is still relatively low, as seen from the student is unable to determine strategy which was to solve the problem of disproportionate and students cannot identify relationships that existed at the multiplication of proportional reasoning problems. So the purpose of this study was to: (1) Know the difference effect of the application of the model problem based learning and conventional learning models to proportional reasoning abilities of students; (2) Know the difference effect of the application of the model problem based learning and conventional learning models to special proportional reasoning abilities of students who have high achievement for motivation, medium, and low. The population in this study was all class XI student of SMK Tunas Husada Kendari. The sampling technique in the study was to directly take the sample without any randomization task because the parameter or population was not homogeneity. The treatment and control class were determined based on the number of sample taken and divided in half and half. The results of the analysis of descriptive and inferential analysis using two different test Mean of data of N-gain for proportional reasoning abilities of students can be concluded that: (1) 88.24% of students who have high proportional reasoning ability and 11.767% of students who have the proportional reasoning ability was once taught by learning problem based learning; (2) Application of problem based learning models had a greater impact than conventional learning models to proportional reasoning abilities of students; (3) Application of problem based learning models had a greater impact than conventional learning models to proportional reasoning ability, good students with high achievement motivation, medium or low.

Key Words: Proportional Reasoning Ability, Motivation Achievement and Problem Based Learning

A. Introduction
Reasoning in mathematics education plays an important role. It is seen by making reasoning as one of the goals of mathematics education in Indonesia contained in the Ministerial Regulation No. 22 of 2006 on the Content Standards that use reasoning on patterns and properties perform mathematical manipulation in making generalizations, compile evidence, or explain mathematical ideas and statements (Sadiq, 2009: 2). Problem reasoning is the first thing that needs to be understood with regard to the assessment of the basic concepts of mathematics because reasoning is the foundation for the study of mathematical concepts hereinafter (Prihandoko, 2005: 7). So as to obtain a high students‘ achievement in mathematics, the mathematics learning should be emphasized that address both the development of reasoning abilities of students. One of the critical reasoning abilities in mathematics is proportional reasoning abilities.
But the reality on the ground shows that the reasoning abilities of students internationally and nationally are still low. Rosnawati’s research results (2013: 3) states that internationally, the average percentage of students who answered correctly in a matter of reasoning dimension TIMMS 2011 was only 30% and the percentage of students Indonesia only 17%. When viewed from the average percentage of students internationally, the reasoning abilities of students in Indonesia are below average.

The studies conducted by Jitendra et al (2009: 1) concluded that one of the main problems in reasoning proportional is problem solving of the proportion that students tend to use the strategy of addition or subtraction (level 0) rather than strategy cross product (level 3), which can cause students gain a wrong answer. For example, to complete a 6: 14 = x: 35, students prefer finding the difference of 14 and 6 and then 35 minus 8 to get 27: 35 rather than finding multiplicative relationship. Several studies have found that in general students are not able to identify the relationship multiplication of proportional reasoning problems.

Based on preliminary observations in SMK Tunas Husada showed that students’ reasoning proportional were still low. Most students are not able to model the problem in equation form of the proportion properly, it cannot determine suitable strategy to solve the problem of disproportionate and students cannot identify relationships that existed at the multiplication of proportional reasoning problems. Thus the need to be assessed on a strategy to solve the problems of proportion, the link between the strategies in solving the problem is proportional to proportional reasoning, and algorithms proportions. In addition, acquired also an indication of the low proportional reasoning ability students include students feel bored in learning, students’ passive learning, students are not self-sufficient in constructing knowledge and students are not trained to develop proportional reasoning abilities. It shows that not a mathematic which are difficult to study, but due to the applied learning does not match the needs of students and the learning that takes place is not meaningful to students.

Mathematics learning in some schools in Indonesia are also in SMK Tunas Husada Kendari for this is still carrying out the conventional learning that does not comply with the demands of the current KTSP curriculum. Moreover, it also has not made proportional reasoning students as something that needs to be trained to increase the proportional reasoning problem-solving skills. Nasution (2005: 209-211) states that conventional mathematics learning is still taking place in schools, dominated by the old paradigm is the paradigm of teaching with the characteristics: (a) an active teacher transfer knowledge into the minds of students; (B) students passively receive knowledge (students try to memorize the knowledge received); (C) mechanistic learning; (D) learning begins with the teacher explain a concept or procedure to solve problems, provide practice questions in students; (E) teacher checks and gives a score on the student’s work.

One model of learning that attracts and engages students actively in learning that can be used in schools to achieve the learning objectives in particular with regard to the increase in proportional reasoning abilities of students is the Problem Based Learning (PBL). Judging from its characteristics, PBL is one alternative learning model that can be selected to study proportional reasoning. PBL as learning model that can use a real problem as a context for students to learn critical thinking, problem-solving skills, and gain knowledge about the essence of teaching materials (Duch in Nurkholis, 2013). The effectiveness of PBL is that students are more active in thinking and understanding of proportional reasoning problems in groups with an investigation into the problems so that they get the impression of a deep and meaningful about the problems they have learned.

In addition to the model of learning, achievement motivation also affects the quality of students’ learning, especially reasoning abilities. Based on observations in SMK Tunas Husada Kendari, most students did not have a high mathematics achievement motivation. Students tend not trying to excel in learning mathematics, students lack a job well done, the students preferred issues simple math, and students were more like to imitate the work of his friend than to resolve it yourself.

Achievement motivation is important because achievement motivation is the driving force that allows someone managed to achieve what is aspired. Motivation of achievement may foster learning more meaningful. So the learning activities that have been prepared teachers will be run in accordance with the plans and objectives to be achieved.
B. Literature Review

Lamon (Wright, 2011: 51) defines reasoning proportionally as a reason to support a statement about the structural relationship between the four quantities, (eg a, b, c, d) in the context of simultaneous involves the covariance of the number and invariant ratio, it will consist of the ability to distinguish the relationship between two quantities multiplication and the ability to extend the same relationship to other couples. Van de Walle (Cordel & Mason, 2000: 3) states proportional reasoning is the ability to think and compare the relationship between the number of multiplication or values. Lamon (Allain, 2000: 7) states that "proportional reasoning Consist of being able to construct and solve algebraically proportions" which means that proportional reasoning is the ability to build and solve problems in algebraic of the proportion.

Fahinu (2010: 9) states that proportional reasoning has four levels solving strategies such as shown in Table 1 below.

<table>
<thead>
<tr>
<th>Level</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Using cross product strategy</td>
</tr>
<tr>
<td>2</td>
<td>Using pictures, models, a strategy of manipulation and multiplication / division</td>
</tr>
<tr>
<td>1</td>
<td>Using pictures, models, manipulation</td>
</tr>
<tr>
<td>0</td>
<td>Using the summation strategies and solutions obtained by luck.</td>
</tr>
</tbody>
</table>

Ibrahim & Nur in Puspitasari (2011: 1) & Arends in Jauhar (2011: 1) argue PBL syntax is as follows:
1. Phase student orientation to problem
   Teachers explain the purpose of learning, explained the logistics required, motivate students actively involved in solving problems
2. Organizing students to learn
   Teachers help students define and organize learning tasks related to the issue
3. Guiding individuals and groups investigation
   Teachers encourage students to gather the appropriate information to get an explanation and problem solving.
4. Develop and present work
   Teachers assist students in planning and preparing the results of solving problems and helping students to share tasks with friends
5. Analyze and evaluate the problem solving process
   Teachers help students to reflection or evaluation of the student's work and processes that students use

Johnson in Djaali (2008: 109) people who have high achievement motivation has the following characteristics:
1. Liking situations or tasks that demand personal responsibility for results and not on the basis of chance, fate, or chance.
2. Choosing a realistic but challenging goal of achievable goals that are too easy or too much risk.
3. Looking for a situation or job to gain immediate feedback and real good to determine whether or not a job.
4. Glad to work alone and compete to surpass others.
5. Able to defer gratification of desire for the sake of a better future.
6. Do not bother to just get money, status, or other benefits, it will seek when these things is a symbol of accomplishment, a measure of success.

Based on the above characteristics, Djaali concluded that indicators of achievement motivation include: (i) trying to excel; (ii) a job well done; (iii) rational in achieving success; (iv) likes a challenge; (v) accept personal responsibility for success; (vi) liked the job situation with personal responsibility, feedback, and a medium level of risk.

C. Methodology

This type of research is a Quasi-Experimental Research Design with model Non-equivalent Control Group Design, which is described as follows.

<table>
<thead>
<tr>
<th>EC</th>
<th>O₁</th>
<th>X</th>
<th>O₂</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CC</th>
<th>O₁</th>
<th>-</th>
<th>O₂</th>
</tr>
</thead>
</table>

(Sugiyono, 2011:112)
Explanation:
EC = Experimental Class
CC = Control Class
X = The new treatment, which is a model of problem based learning
- = Long treatment, the conventional learning models.
O₁ = Pretest students and administration of the questionnaire before learning
O₂ = Posttest students after learning

The research was conducted at the class XI student of SMK Tunas Husada Kendari in Southeast Sulawesi province in the second semester of the Academic Year 2013/2014 consisting of five parallel classes. The population of this study was all students of class XI. Due to the design used is Quasi Experiment with models Non-equivalent Control Group Design, the samples taken was not randomly i.e. by taking directly and determined the control group and the experimental group. Then, the two groups were given a pretest and then given treatment and posttest last given. The variables in this study consists of one independent variable that models Problem Based Learning (PBL) by the symbol (X), a moderate namely achievement motivation variable, and one dependent variable which is proportional reasoning abilities of students by symbol (Y). To obtain the data in this study used research instruments namely: (1) achievement motivation questionnaire was used to determine the category of achievement motivation; (2) Observation sheet to measure the level of activity or participation of teachers and students in the learning process by using a mathematical model of problem-based learning; and (3) The written test in the form of the description (essay) is used to measure students' reasoning ability proportionally composed of about pretest and posttest. Before the test proportional reasoning ability and achievement motivation questionnaire is used, it must first be tested to measure the validity and reliability.

Statistical analysis of the data in this study included descriptive statistical analysis used to describe the earned value of each class in the form of average, maximum value, minimum value and standard deviation. Distribution category for the value proportional reasoning ability and achievement motivation of students used the assessment criteria benchmark reference. Kadir (2010: 251) states that the criteria for the level of the students in the category of achievement motivation high, medium and low, namely: 1) interval 80% x 100% high category, 2) interval of 60% x <80% categorized as moderate, and 3) the interval 0 % x <60% low category.

Inferential statistical analysis were used to test the hypotheses of the study, but first tested for normality and homogeneity tests as a prerequisite test to test the hypothesis. The data used in the normality test and t-test scores shaped Gain Normalized (N-gain). Normal formula in Herlanti gain by Meltzer (2006: 71) are:

\[ N\text{-gain} = \frac{\text{skor posttest} - \text{skor pretest}}{\text{skormaksimal ideal} - \text{skor pretest}} \]

Criteria interpretation of scores N-gain is:
N-gain higher if the N-gain > 0.7
N-gain medium if 0.3 < N-gain ≤ 0.7
N-gain low if N ≤ 0.3

The T-test for unpaired data. The statistic test used is as follows.

\[ t = \frac{(\overline{X}_1 - \overline{X}_2)}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \]

\[ S_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \]  
(Walpole, 1993: 305)

D. Finding and Discussion
1. Findings
The significance test of differences in achievement motivation of students between the experimental class and control class by using Different Two Mean for data unpaired values obtained \( P_{value} \) to the category of achievement motivation combined, high, medium, and low respectively 0.790, 0.501, 0.079, 0.584 indicating that achievement motivation there is no difference between the experimental class and control class.
Differences Influence Model Application of Problem Based Learning and Conventional Learning Model against Students' Proportional Reasoning Ability.

Significance test was to test for differences in the effect of applying the model of problem based learning and conventional learning models to proportional reasoning abilities of students is different test Two Central Value for unpaired data is presented in Table 2.

**Table 2. Differences Influence Application of Significance Tests Two Models of Learning against Students' Proportional Reasoning Ability**

<table>
<thead>
<tr>
<th>Learning Model</th>
<th>N</th>
<th>Mean</th>
<th>Standard of Deviation</th>
<th>t</th>
<th>df</th>
<th>P_value</th>
<th>H_0</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Problem Based Learning</em></td>
<td>34</td>
<td>0.842</td>
<td>0.070</td>
<td>8,741</td>
<td>32,823</td>
<td>0.000</td>
<td>Tolak</td>
</tr>
<tr>
<td><em>Conventional Learning</em></td>
<td>25</td>
<td>0.575</td>
<td>0.140</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Differences Influence Model Application of Problem Based Learning and Learning Model Conventional Against Students' Proportional Reasoning Ability by Category Achievement Motivation

Descriptive analysis of the data proportional reasoning abilities of the two groups of students learning based on student achievement motivation classification categories are presented in Table 4.3.

**Table 3. Data Description of Students' Proportional Reasoning Ability of the Second Group of Learning based on each Category Achievement Motivation**

<table>
<thead>
<tr>
<th>Category Achievement Motivation</th>
<th>Statistic</th>
<th>Problem Based Learning N-Gain</th>
<th>Conventional Learning N-Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
</tr>
<tr>
<td>High</td>
<td>N</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>23,140</td>
<td>91,529</td>
</tr>
<tr>
<td></td>
<td>Standard of Deviation</td>
<td>4,168</td>
<td>3,815</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>31,818</td>
<td>97,727</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>15,909</td>
<td>84,091</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>16,287</td>
<td>85,984</td>
</tr>
<tr>
<td></td>
<td>Standard of Deviation</td>
<td>2,942</td>
<td>5,126</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>20,455</td>
<td>93,182</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>11,364</td>
<td>75,000</td>
</tr>
<tr>
<td>Medium</td>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>12,272</td>
<td>80,454</td>
</tr>
<tr>
<td></td>
<td>Standard of Deviation</td>
<td>7,114</td>
<td>5,473</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>25,000</td>
<td>86,364</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>9,091</td>
<td>72,727</td>
</tr>
</tbody>
</table>

Results of normality test, homogeneity, and the significance of differences in the effects of both the learning model based on achievement motivation categories of data N-Gain proportional reasoning abilities are presented in Table 4.4.

**Table 4. Normality Test, Homogeneity and Significance of Differences Influence of Two Models of Learning By Category Achievement Motivation**

<table>
<thead>
<tr>
<th>Category Achievement Motivation</th>
<th>Model</th>
<th>KS-Z</th>
<th>Levene Statistic</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P_{value}</td>
<td>H_0</td>
<td>P_{value}</td>
</tr>
<tr>
<td>High</td>
<td>Problem Based Learning</td>
<td>0,593</td>
<td>Accepted</td>
<td>0,019</td>
</tr>
<tr>
<td></td>
<td>Conventional Learning</td>
<td>0,829</td>
<td>Accepted</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>Problem Based Learning</td>
<td>0,786</td>
<td>Accepted</td>
<td>0,051</td>
</tr>
</tbody>
</table>
Learning Conventional Learning Problem Based Learning Conventional Learning
Low 0,927 Accepted 0,911 Accepted 0,867 Accepted
       0,280 Accepted 0,017 Rejected

2. Discussion

Based on the results of the analysis show that there are differences in the proportional reasoning abilities of students who are taught by a model problem based learning and conventional learning models. It means that differences in proportional reasoning abilities that exist for learning the difference in treatment given to each class. Hypothesis test results showed that the application of the model problem based learning had a greater impact than conventional learning models to proportional reasoning skills students are well reviewed by categories of student achievement motivation and achievement motivation without category.

The results of this study are consistent with results of previous studies that Saputra (2013), Herman (2007), Yumiati (2013) & Choridah (2013) which states that students who get a model problem based learning significantly to acquire the ability to think mathematically in particular the ability of reasoning proportional higher than students who received conventional learning.

Activities of the students in problem-based learning are increased compared to conventional learning can foster students' understanding of math problems given so as to facilitate them to solve the problem. This is demonstrated by the increasing proportional reasoning abilities of students. This is in accordance with the opinion of Arends (2008: 43) that the learning problem-based learning can help students develop thinking skills, problem-solving skills as well as skills for independent learning and social skills.

In general, it can be concluded that there is a difference between the proportional reasoning abilities of students taught using problem based learning models and conventional learning models without category or by category of achievement motivation. This indicates that there are significant application of problem based learning to proportional reasoning abilities of students.

E. Conclusion

1. Application of problem based learning models had a greater impact than conventional learning models to proportional reasoning abilities of students.
2. Application of problem based learning models had a greater impact than conventional learning models to special proportional reasoning abilities of students who have high achievement motivation.
3. Application of problem based learning models had a greater impact than conventional learning models to special proportional reasoning abilities of students who have moderate achievement motivation.
4. Application of problem based learning models had a greater impact than conventional learning models to special proportional reasoning skills students have low achievement motivation.

REFERENCES


THE IMPROVEMENT OF MATHEMATICS COMMUNICATION FOR JUNIOR HIGH SCHOOL STUDENTS THROUGH CONTEXTUAL MATHEMATICS LEARNING

Abstract

This study aims to (1) obtain a mathematical description of the communication skills of students with mathematics learning contextual learning and student learning by conventional teaching; (2) To determine the improvement of communication skills students learn mathematics with math contextual learning and student learning by conventional teaching; (3) In order to obtain comparative increase in mathematical communication skills students learn mathematics contextual learning and student learning by conventional teaching; (4) In order to obtain a description of the activity of students in mathematics learning contextual; (5) In order to obtain a description of what students about math learning contextual. This research was conducted by using a quasi-experimental design with the model of the Non-equivalent Pretest and Posttest Control Group. The population in this study was all students of class VIII SMP Negeri 1 Kolaka with samples of two classes as experimental class and control class. The instrument used in this study consisted of communication test instruments and mathematical abilities nontes instruments, such as observation sheets, and opened questionnaire sheet. The analysis used is descriptive analysis, significant test one sample, and the average difference in of two. The results showed that in general the contextual learning mathematics can improve communication skills of mathematics. Learning math can be used as an alternative contextual learning for teachers, especially for math students improve communication skills.

Keywords: contextual mathematics learning, conventional learning, mathematical communication skills.

A. Introduction

Mathematical communication is very important in the learning process of mathematics, because through communication mathematics students reflect, clarify, and expand ideas and understanding of mathematical relationships and can be expressed this argument, it is in accordance with the Ontario Ministry of Education (2005). Communication can be defined mathematically as a dialogue or a related event that occurred in a classroom environment where there is a transfer message. Messages are routed contains material students are learning math, for example in the form of concepts, formulas, and problem-solving strategies. Parties involved in the communication event in a classroom environment for teachers and students. How to redirect the message may include oral and written (Rahayu, 2006). Ministry of Education (2006: 8) states that the mathematical language to communicate ideas with even more practical, systematic and efficient. When students are challenged to communicate the results of his thoughts to other students, both orally and in writing, then they learn to clarify, persuade, and right in using the language of mathematics (NCTM, 2000). The activities included in the mathematical communication according to Sumarmo (2006) are: (1) stating a situation,
drawing, diagram, or a real object into the language, symbols, ideas, or mathematical models; (2) explaining ideas, situations, and relationships math orally or in writing; (3) listen, discuss, and write about mathematics. (4) reading with understanding a written mathematical representation; (5) making a conjecture, making the argument, a definition, a generalization; (6) revisits a mathematical description or paragraph in their own tongues.

But the reality on the ground shows that the communication skills of mathematics students is still low, such as: students are less able to explain the idea in the form of text and images, it is difficult stating a diagram into a symbolic language, students are less able to express an idea with their own words and disadvantaged students expressed his opinion in learning. Results of preliminary research conducted by Herlina, et al (2012) in three schools in Kolaka that SMPN 1 Kolaka, SMPN SATAP 1 Mowewe, and SMAN 1 Tanggetada by providing communication test of mathematics that has been validated by the subject teachers of mathematics shows that students are not able to (1) state about the story in the form of an image; (2) create a mathematical model of word problems; and (3) complete the mathematical model. Students’ mathematical communication skills can be improved by training students to communicate problems or ideas, either orally or in writing. A problem or idea would be easily communicated by the student if the problem is nothing to do with the activity or activities of students daily. We can say problems or ideas should be in conformity with the context of students’ everyday lives. This is in line with the contextual meaning to learning Contextual Teaching and Learning (CTL).

Based on issues outlined above, the author tries to apply contextual learning mathematics under the title of “The Improvement of Mathematical Communications Ability through Contextual Math Learning.”

B. Literature Review

Contextual Teaching and Learning departs from a belief that someone is interested in learning when he saw the meaning of what he learned. People will see the meaning of what he learned if he can connect the information received with the knowledge and previous experience. This is in accordance with the expression Johnson (2002) that the CTL system is based on the assumption that the meaning arises from the relationship between content and context. Context gives meaning to the content. If students can connect more lessons at school with this context, it is so much more meaning to be derived from these lessons. Finding meaning in the knowledge and skills to bring on the mastery of knowledge and skills is a must. It can be said when the students find the meaning of school, then they will understand and remember what they have learned. Heuvel-Panhuizen in Ward (2004) states that in mathematics learning is contextual, process development of concepts and mathematical ideas originated from the real world. The real world does not just mean physically concrete, but also includes things that can be imagined by the NII in accordance with the mind of Students’ experience. This means that the problems posed at the beginning of contextual learning mateamtika are actual problems for students (sincerely exist in reality of student life) or problems that can be imagined as a real problem by the students.

CTL is the foundation philosophy of constructivism. According to the constructivist (Suparno, 2012: 61) students’ learning is an active process of constructing meaning, both from the text, dialogue, physical experience, and Lail more. According to the Ministry of Education (2002: 26), CTL-based learning involves seven major components of productive learning, namely: (1) constructivism, which is emphasizing the understanding of the students themselves are active, creative, and productive based on knowledge and meaningful learning experiences; (2) asking (questioning) is a way for someone to gain knowledge; find (inquiry) is an activity that starts from the observation of the phenomenon continued with meaningful activities to produce the findings obtained by the students; community learning (learning community) that learning should be consistently implemented in study groups; modeling (modeling) is a form of learning certain skills and knowledge using a model that can be replicated students; reflection (reflection) yatu kambaali reflection of what is newly learned; actual votes (authentic assessment) is the process of collecting a variety of data that can bring an idea or information about the development of students’ learning experiences. This study focused in mathematics so that the application of CTL in learning math hereafter referred to as contextual learning.

One of the alternatives that can be used by teachers to improve students' communication skills math is math learning contextual. The logic is that if the students were asked about their daily activities, then they will easily communicate, so with contextual mathematics instruction makes learning math as daily activities so that students are expected to also be able to
communicate mathematics as well as to communicate their daily activities. Contextual mathematics learning involves students actively, make learning more fun. The link between learning material and real life students give awareness about the usefulness of mathematics. Contextual learning mathematics is intended for learning mathematics in school is not seen as the delivery or transfer of knowledge per se, but the learning of mathematics is seen as a mathematical activity. Mathematization is the process of translating the mathematical problems into mathematical form contextual formal or informal. In order for the process of translating the mathematical form of contextual into formal mathematical forms became easier, use informal mathematical form or by drawing sketches. For example, contextual mathematical forms: a child has seven marbles, given to her as much as four points. Then the rest of the child’s marbles are three grains. So they can easily solve the problems of this contextual converted into informal mathematics as follows.

\[
\begin{align*}
\text{\textcircled{7}} \text{\textcircled{7}} \text{\textcircled{7}} \text{\textcircled{7}} \text{\textcircled{7}} \text{\textcircled{7}} - \text{\textcircled{4}} \text{\textcircled{4}} &= \text{\textcircled{3}}
\end{align*}
\]

Furthermore it can be converted into formal form becoming 7-4 = 3.

In the conventional learning teachers explain the learning materials, and then gave several examples of problems and how to solve them and after that the students do practice questions individually. Teaching is similar to classical learning, where teachers taught a number of students in the room that has the ability to minimum requirements for that level. Interest, interests, skills, and students in learning speed assumed to be equal. Teachers generally dominating the class, students are passive and just accept (Ruseffendi, 1991)

C. Methodology

A sample of 47 students of class VIII SMP, divided into one experimental class (21) and one control class (26), which is elected directly by the researcher. Experimental class taught mathematics contextual learning, whereas the control class was taught by conventional learning. The instrument used to collect data, namely: (1) test communication of capabilities of mathematical description is tested as many as 6 numbers. Before these tests are used, first do some validation, namely: appearance (surface) and the contents by the supervisor, lecturer, mathematics education experts and school teachers. Validation views (surface) include: clarity in terms of language, clarity in terms of numbers or symbols, clarity in terms of image/representation. Validation of contents, include: compliance with the material, conformity with indicators of learning achievement, conformity with the characteristics of mathematical communication skills, compliance with the level of difficulty of Class VIII students of SMP. Additionally, conducted limited trials to test the legibility tested to four students; (2) Observation Sheet for Contextual Mathematics Learning Process; (3) Observation Sheet for Conventional Learning Process; (4) open questionnaire to collect data about students’ opinions and comments about contextual learning mathematics. To determine the increase of each class is calculated using the formula N-Gain. The average value of the N-Gain will be consulted by category Hake (1999: 1), namely the high g if g > 0.7; g was if 0.3 < g ≤ 0.7; Low g, if g ≤ 0.3. The average value of N-t Gain tested the samples to determine its significance. Differences average increase of two N-Gain tested with two different t-test average.

D. Finding and Discussion

1. Findings

Descriptively, the students’ pretest of experimental class obtained the lowest score of 5.88, the highest score of 72.06; an average of 36.48 with a standard deviation of 19.25. In the control group obtained the lowest score of 0; the highest score of 29.41; an average of 6.33; and a standard deviation of 7.89. To score the experimental class postes obtained the lowest score 25; the highest score of 100; an average of 61.41 and a standard deviation of 21.35. While in the control group obtained the lowest score of 0; the highest score of 62.5; an average of 15.39; and a standard deviation of 13.06. Based on the calculation of N-Gain, it was gained an average of N-Gain experimental class 0.41 (medium) and the control class 0.07 (low). The test results showed that the average increase in mathematical communication skills students learn by teaching mathematics contextually higher than students learning with conventional learning.
2. Discussion

The average test results showed that the increase of students’ mathematical communication skills who learn with teaching of mathematics contextually was higher than students who learning with conventional learning. This is in accordance with the expression Johnson (2002) that the CTL system is based on the assumption that the meaning arises from the relationship between content and context. Context gives meaning to the content. If students can connect more lessons at school with this context, it is so much more meaning to be derived from these lessons. Finding meaning in the knowledge and skills aim to bring at the mastery of knowledge and skills. It can be said that when the students find the meaning of school, then they will understand and remember what they have learned.

At the first meeting illustrated that all the students were very enthusiastic but students confused by the unusual LKS they get but at the next meeting the students were able to perform their activities better than previous meetings. The object selected was contextual traffic signs, bicycle chains, and a pulley that had to do with the material being studied is tangent to the circle. Students were very enthusiastic response to their presentation. To propose the idea, still a few students dared to propose the idea. In general, activity in the classical interaction was increased. Contextual learning mathematics has made the students more active in participating in learning activities and more important is learning becomes more meaningful.

In the control group, it appears that most students just pay attention to the teacher explains the material on the board, then copy it in a notebook and memorize the formula. This indicates that the formulas apart from the experience of previous students, so that what they earn is not meaningful. Students then complete the questions on the worksheet. LKS usual, which does not allow students to construct their own knowledge, can easily be done a small proportion of students. Students are quite imitating the teacher using the formula in solving problems. But if the teacher asked the students got more or unusual problems, the students solve the confusion. There are students who say "because not the same as the example" and some are saying "no formula". Students only happy to resolve the problems outstanding and bored if it finds problems are not uncommon. So, most students just passively waiting for the teacher report missing correct answer.

Atmosphere of control class was fairly quiet because there was no group discussion. It was one or two students who occasionally had questions. This was due to the application of conventional learning. In general, conventional learning cannot improve the students' communication skills, especially math.

In general, students who get contextual learning mathematics give a positive opinion on that learning. This is supported by the results of the acquisition of the opinions and comments of 21 students as much as 68.18% of students found positive for contextual learning mathematics. Quite a high percentage of positive opinions of students indicated that students feel happy and feel more helped in understanding the concepts of mathematics with math learning contextual. Students who think positive have the possibility to support interactive learning atmosphere between students and students, students and teachers, and students in the environment. This provides a positive impact to the development of mathematical communication skills of students, which is visible from the increase in the ability of the experimental class that gets mathematics contextual learning was higher than the control class who received conventional learning.

E. Conclusion

Mathematical communication skills of students before treated as very low both students who obtain contextual learning of mathematics and students who received conventional learning. After receiving treatment, mathematical communication skills of students who obtain contextual learning of mathematics quite enough, while the mathematical communication skills of students who received conventional learning is still very low.

There is an increasing mathematical communication skill, both students who obtain contextual learning of mathematics and students who received conventional learning. Improved communication skills students acquire mathematical contextual learning mathematics is higher than the increase of mathematical communication skills of students who received conventional mathematical learning. In the aspect of students’ activity in contextual learning process, student activities in completing a task individually and discuss in groups quite good compared to the activity of students in the learning process conventional. Although at the beginning of the meeting there are still constraints. This occurs because the new learning known students so that
students are not familiar with this way of learning. At the following meeting, the constraints became on the wane. In general, students have positive opinions towards learning mathematics context.

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EFFECT OF STUDENTS’ LEARNING INTERESTS, ATTITUDES, AND PERCEPTION ABOUT TEACHER’S TEACHING TECHNIQUE TOWARD MATH LEARNING OUTCOMES IN CLASS VIII SMP NEGERI IN THE DISTRICT BULUKUMBA

Abstract

The influence of students’ learning interest, attitude, and perception on teacher’s teaching technique toward math learning outcome of the Eight Grade Students at State Secondary Schools in Bulukumba. Mathematics learning outcomes one of measuring tools to know the quality of a mathematics learning outcomes; however; this research is limited into learning interest, attitude, and student's perception on teaching method. It aims to reveal the influences of learning interest and student's perception on teaching method toward students’ mathematics learning outcomes both directly and indirectly through attitude to mathematics subject of the eight grade students at state secondary schools in Bulukumba. Population of this research was 235 students at class VIII of 34 state secondary schools in Bulukumba, in academic year of 2013/2014 which included in A, B, and C accreditation. The sample was taken through proportional stratified random sampling. Moreover, the instruments used in this research were: 1) scale of learning interest, 2) scale of student’s perception on teaching method, 3) scale of attitude in mathematics as well as mathematics learning outcome test. Data analysis applied a descriptive statistics and SEM (Structural Equation Modeling) analysis. The result shows that: 1) most of eight grade students of state secondary school in Bulukumba have 84% students with a good learning interest, 76.5% of them have a good perception on teaching method, and 77% of them have a good attitude to the mathematics subject; 2) learning interest and student’s perception have a significant positive influence to the attitude in mathematics learning; 3) learning interest, students perception on teaching method, and attitude toward mathematics subject has a significant positive influence toward mathematics learning outcomes; 4) learning interest has a significant positive influence to the student’s perception on teaching method; 5) learning interest has a significant positive influence indirectly though the attitude toward mathematics learning outcomes; and 6) students’ perception on teaching method has a significant positive influences indirectly through the attitude toward mathematics learning outcomes.

Key Words: Learning Outcomes of Mathematics, learning interest, attitude, students perception on teaching method of teacher

A. Introduction

Mathematics is a science that is very useful in solving the problems of life and in an effort to understand the other sciences. In each level of education, learning mathematics for students is not easy, because math is abstract. Especially for students who are still in junior high school, especially the eighth grade students are required to think abstractly and understand verbal symbols, are still experiencing difficulties.

Huzzah (2008) suggests, according to the research team Program of International Student Assessment (PISA) in 2001 showed that Indonesia was ranked 9th out of 41 countries in
mathematical literature category. Meanwhile, according to the study Trends in International Mathematics and Science Study (TIMMS) in 1999, mathematics in Indonesia is ranked 34th out of 38 countries (data UNESCO).

Given the considerable number of variables that come from inside and outside the student that affects the outcome of learning mathematics, as well as the limited number of researchers in a variety of things such as cost, time, and abilities, the researchers limit themselves to the study, which only pay attention to variable interest in learning, attitudes the math, and perceptions of students about how teachers teach for learning outcomes, especially mathematics. The results that will be obtained are expected to be useful information in an effort to improve mathematics learning outcomes at every level of education, particularly at secondary school.

The formulation of the problem in this study as follows.
1. How is description of interest in learning math, attitudes toward math, perceptions of students on the teachers’ teaching technique, and the results of students' mathematics learning in class VIII SMP Negeri in Bulukumba?
2. How does learning and perceptions of students on the teachers’ teaching technique at the eighth grade at Junior High Schools in Bulukumba?
3. How much influence on attitudes, the interest in learning, students' perceptions on the teachers' teaching technique in math at class VIII students at Junior High School in Bulukumba?
4. How much influence on the interest in learning, attitudes toward math, and perceptions of students on the teachers' teaching technique in mathematics for learning outcomes for the eighth grade students at SMP Negeri in Bulukumba.
5. How much influence on the indirect interest in learning and students' perception on the teachers’ teaching technique in mathematics for learning outcomes through attitude toward math at class VIII students at Junior High School in Bulukumba?

B. Literature Review

1. Mathematic Learning Outcome

The result of learning is the ability of the students after receiving their learning experience. The process of assessment of learning outcomes can provide information to teachers about student progress in achieving the goals of learning through learning activities. According to (Hamalik, 2009: 20) The results of learning a thing that can be viewed from two sides of the side of the students and teachers.

2. Learning interest

According to Elizabeth B.Hurlock in Murtafiah (2013: 26) writes about the function of interest for the life of a child as follows: (1) interest affecting the shape of the intensity of aspiration, (2) interest as a strong driving force, (3) the results are always influenced by the type and intensity, (4) interest formed since childhood often carry over lifetime due to interest bring satisfaction.

3. Attitude toward Math Lesson

Slameto (2010: 188) states that the attitude involves three components, namely the cognitive component, affective component, and component behavior. The attitude is always concerned with an object, and the attitude is accompanied by positive or negative feelings. Thus a student will be positive if they see something of value in his view, on the contrary to be negative if you see a worthless or harmful.

4. Students’ Perception of How Teachers Teach

Miftah Toha in Arisana, Arga lacopa & Ismani (2012) says that perception is a cognitive process experienced by everyone in understanding the information about the environment, whether through sight, hearing, appreciation, feeling and smell. Students' Perceptions of Teaching Quality of Good teacher will give a sense of comfort in following the lessons and will facilitate students in the material presented by the teacher so that the learning achievement will be able to achieve optimal results.

5. Research hypothesis

The following are the hypotheses that are used in this study:
1. Hypotheses regarded direct prediction
   Hypothesis 1; Interest in learning positively effects on the students' perception on the teachers' teaching technique
Hypothesis 2; Interest in learning positively effects on the attitude of the math
Hypothesis 3; Students’ perception on the teachers’ teaching technique positively  
influences on the attitude to the math
Hypothesis 4; Interest in learning positively influences on mathematics learning outcomes
Hypothesis 5 teachers’ perception on the teachers’ teaching technique positively 
influences on mathematics learning outcomes
Hypothesis 6; Attitude to the math instruction positively influences on mathematics  
learning outcomes
Hypothesis 7; Interest in learning positively effects on students’ perception on the  
teachers’ teaching technique
2. Hypothesis regarded indirect prediction
Hypothesis 7; Interest in learning positively influences on mathematics learning outcomes through attitude in math
Hypothesis 8; Students’ perception on the teachers’ teaching technique positively 
influence on mathematics learning outcomes through attitude to math instruction.

C. Methodology
This study was classified as ex-post facto design which is causality. Ex-post facto here means to explain the causal relationship between the variables and to test hypotheses that had been formulated before namely the interest in learning, attitudes toward math, and perceptions of students on the teachers’ teaching technique in math to the learning outcomes of three (3) teaching materials that had been taught before.

The population in this study was all students in class VIII SMP Negeri in Bulukumba the academic year 2013/2014 as many as 34 schools. The sampling method used to obtain a random sample to represent the characteristics of the population is using the technique of random sampling strata proportional (proportional stratified random sampling) with the amount of sample is 235 students.

The data collection is done by using a Likert scale with 4 possible answers consisted of A Great Fit/Strongly Agree (SA), Under/Accept (A), Unsuitable/Disagree (D), Very Inappropriate/Strongly Disagree (SD) (Sugiyono, 2011: 93). The scoring on this scale ranging from 1-4 based on the items that are favorable and unfavorable. For items that are favorable score answers SA = 4, A = 3, D = 2, SD = 1. For items that are unfavorable score answers SA = 1, A = 2, D = 3, SD = 4.

Analysis of the data used in this study consisted of two stages. The first was the analysis of the data for the item that the statement in the instrument, the second was the analysis of data to answer the research problem. Data analysis technique used is descriptive and inferential statistics. Descriptive statistics is required to describe the data of the variables of the proposed research includes the mean, median, variance, skewness, kurtosis, minimum, maximum, and percentage analysis. Inferential statistics for the purpose of analysis and validation of the proposed model and hypothesis testing. Therefore, analytical techniques SEM using AMOS program package (Analysis Of Moment Structure) IBM IBM SPSS version 20.0 and version 20.0.

1. Item Instrument Analysis
To assess the accuracy of measurement of an item instrument used to measure the construct validation grain constructs reliability. Terms used to analyze the validity and reliability of the construct is that each indicator has a uni-dimensionality nature of the construct (Wong, 2007). In this study each item statement in the instrument is seen as an indicator of the construct. To that end, the statistical test used is Confirmatory Factor Analysis (CFA). Uni-dimensionality test (test the suitability of the model); b) Test Significance Coefficient Weight Factor: Validity and Reliability of indicators; c) Evaluation of reliability of the construct.

2. Statistical Analysis Requirements
In using SEM analysis, there are some assumptions that need to be met as follows (Kusnendi, 2008: 46): a) Sample Size; b) Linearity c) Normality endogenous latent variables; d) Detection of outliers (outliers); and e) Multicolinearity.

D. Finding and Discussion
1. Findings
Based on the results of descriptive analysis show that mathematics learning outcomes Junior High School eighth grade students in Bulukumba classified in the high category. Interest in learning with a score of 16 635 gives a value 84% of students with a
good learning interest. Perceptions about how to teach students with a score of 18,699 teachers indicated that 76.5% of students with student perceptions about teaching good teacher. Attitudes toward math with a total score of 19,015 which means 77% of the students attitudes toward math were good.

Based on the results of inferential statistical analysis showed that (1) there is a positive and significant relationship between interest in learning (X1) and Student Perceptions of How to Teach Teachers (X2) at a significance level of 0.05 with the estimation $\beta_{21} = 0.713$ which is positive with a value of $p = 0.000 < \alpha = 0.05$ significant; (2) there is a direct positive influence and significant interest in learning (X1) against the attitude of the math (X3) at a significance level of 0.05 with the estimation $\gamma_{12} = 0.336$ which is positive with a value of $p = 0.000 < \alpha = 0.05$ is significant; (3) there is a direct positive influence and significance of students' perceptions about how to teach teachers (X2) on attitudes in math (X3) at a significance level of 0.05 with the estimation $\gamma_{23} = 0.552$ which is positive with a value of $p = 0.000 < \alpha = 0.05$ is significant; (4) there is a direct positive influence and significant interest in learning (X1) on the results of learning mathematics (Y) at a significance level of 0.05 with the estimation $\beta_{23} = 0.162$ which is positive with a value of $p = 0.045 < \alpha = 0.05$ significant; (5) there is a direct positive influence and significant interest in learning (X1) and Student Perceptions of How to Teach Teachers (X2) at a significance level of 0.05 with the estimation $\gamma_{23} = 0.552$ which is positive with a value of $p = 0.000 < \alpha = 0.05$ is significant; (6) there is a direct positive influence and significance of the attitude of the math (X3) of the mathematics learning outcomes (Y) at a significance level of 0.05 with the estimation $\gamma_{33} = 0.169$ which is positive with a value of $p = 0.037 < \alpha = 0.05$ significant; (7) there are significant indirect positive and significant interest in learning (X1) through the attitude of the math (X3) of the mathematics learning outcomes (Y) at a significance level of 0.05 with the estimation $\beta_{231} = 0.057$ yang positive with a value of $p = 0.041 < \alpha = 0.05$ significant; (8) are the indirect influence positively and significantly on student perceptions about how to teach teachers (X2) through the attitude of the math (X3) of the mathematics learning outcomes (Y) at a significance level of 0.05 with the estimation results $\beta_{2312} = 0.039$ with $p = 0.036 < \alpha = 0.05$, which is significant.

2. Discussion

Based on the results of testing the third hypothesis suggests that the perception of teachers to teach students about how positive and significant impact on the attitude of the math students. It is supported by the results of previous research conducted by (Muhammad & Waheed, 2011), in a journal titled "Secondary Student’s Attitude towards Mathematics in a Selected School Maldevis".

Based on the results of the fourth hypothesis testing shows that interest bealajar positive and significant impact on learning outcomes in mathematics. The results of this study are supported by several previous studies conducted by Ernawati (2013) with the title of "the influence of emotional intelligence, interest in learning, and cognitive style on students' mathematics learning achievement of class X SMK majoring in fashion in Regency Jenoponto.

Based on the results of the fifth hypothesis testing showed that students' perceptions of how teachers' positive and significant impact on learning outcomes in mathematics. The results of this study are supported by several studies earlier performed by Arisana Arga Lacopa & Ismani (2012) with the title "The Effect of Discipline of Students and Student Perceptions on Quality of Teaching Teachers to Achievement" gives the results of research that there are positive and significant influence on learning achievement rtable students as indicated by the significant level of 5% to 0.195.

Based on the results of the sixth hypothesis testing showed that the attitude to math instruction positive and significant impact on learning outcomes in mathematics. The results of this study are supported by some previous research results conducted by Leonard and Supardi U.S in 2010 with the title "The Effect of Self-Concept, Attitude Students in Math, and Anxiety Students on Mathematics Learning Outcomes".

Based on the results of the seventh hypothesis testing showed that interest in learning positive and significant impact on learning outcomes in mathematics. The results of this research was supported by the results of the study earlier conducted by Ratna
Wulandari & Sumarsih (2011) in her research menemukan that there is a positive and significant relationship of learning and attitudes towards learning and jointly to learning achievement seen from the correlation coefficient \( R \) 55.5%.

Based on the results of the eighth hypothesis testing showed that students' perceptions on the teachers' teaching technique positively and significantly impact on the learning outcomes in mathematics. The results of this study are supported by the results of previous research carried out by Muhammad & Waheed (2011), in a journal entitled "Secondary Student’s Attitude towards Mathematics in a Selected School Maldevis".

**E. Conclusion**

Based on the conclusion, the authors suggest a few things to note: (1) descriptive analaisis results show that mathematics learning outcomes Junior High School eighth grade students in Bulukumba classified in high category. 84% of students had good learning interest. 76.5% of Students’ perception on the teachers’ teaching technique stated that the teachers had teaching techniques. 77% of students had good attitudes toward math. (2) Interest in learning had a positive and significant relationship to the perceptions of students about how teachers taught to the magnitude of the effect of 0.713 or 71.3%. (3) Interest in learning positively and significantly impacted on the attitudes on the subject with the influence of 0.245 or 24.5%. (4) The perception of students on the teachers’ teaching technique positively and significantly impacted on the attitudes to math instruction with the influence of 0.437 or 43.7%. (5) Interest in learning positively and significantly impact on learning outcomes of mathematics with the influence of 0.565 or 56.5%. (6) Perceptions of students on the teachers’ teaching technique positively and significantly impacted on learning outcomes of mathematics with the influence of 0.536 or 53.6%. (7) The attitude towards math positively and significantly impacted on learning outcomes of mathematics with the influence of 0.116 or 11.6%. (8) Interest in learning positively and significantly affected indirectly through attitude in mathematics lessons to the learning outcomes of mathematics with the influence of 0.019 or 1.9%. (9) Perceptions of students on the teachers' teaching technique positively and significantly impacted indirectly through attitude in mathematics lessons to the learning outcomes of mathematics with the influence of 0.051 or 5.1%.

**References**


Murtafiah. 2013. *Pengaruh Kecerdasan Emosional, Pola Asuh Orang Tua, dan Minat Belajar terhadap Prestasi Belajar Matematika Siswa Kelas XI IPA SMAN Di Kota Pare-Pare.* Tesis. PPs UNM.


### Abstract

The purpose of this research was to determine the effect of the attitude and spiritual intelligence toward mathematics achievement of students of class XI MAN Kolaka. This research was conducted in MAN Kolaka starting from April 27 until May 27, 2015 the second semester of the academic year 2014/2015. Subjects in this study were all students of class XI MAN Kolaka in the academic year 2014/2015, amounting to 104 students consisting of four classes, namely class IPA1 totaling 23 people, IPA2 class numbering 24 people, IPS1 class numbering 26 people, and the class IPS2 totaling 31 people. The sample taken from the population was 30% or 32 students. This research included in the type of survey research, in which the researcher acted directly for the data retrieval by looking at student achievement and provide a questionnaire attitudes of students and students’ spiritual intelligence. Data collection in this study using instrument namely questionnaire for attitude of students consisting of 20 items and spiritual intelligence consisted of 20 items. While the documentation was used to collect data concerned mathematics achievement of students of class XI MAN Kolaka. Data analyzed using descriptive statistics and inferential statistics. Based on the analysis, it was concluded that attitude and spiritual intelligence toward mathematics achievement of class XI MAN Kolaka had no significant positive effect on the mathematics achievement. Wherein the hypothesis testing results showed that the test of $t = 0.00005 > T_{table} = 3.31$ at the significant level.

**Key Words:** survey, attitude, spiritual intelligence

### A. Introduction

Education is not just a form of human skills to carry out a particular job, but also foster and develop human values. That is the man who fear Allah and faith in God Almighty, noble and virtuous, intelligent reasoning, able to communicate social and global, healthy and independent. For that education has the responsibility for the achievement of the learning environment and learning process that can develop any competence of learners, to be useful to himself, family, community, and nation. The subjects of mathematics are one of the subjects that are deemed less attractive to students. According to Sriyanto (2004: 12) that negative assumptions of most students about math as a difficult subject can not be separated from the growing perception in the community about mathematics as a difficult subject. Negative perception was shaped by the notion that mathematics is a science that is full of symbols and formulas that are difficult and confusing. This assumption appears on the experience less enjoyable when studying mathematics at school. Consequently, the math is not viewed objectively anymore. This has an impact to the low quality of mathematics learning due to lack of interest in studying the field of...
the study. This fact needs attention given mathematics is one of the basic sciences that can train students to examine an issue that is logical, critical and systematic. Mathematics is also the foundation needed by students to support learning success in higher education, even necessary in solving the problem. In this context, the subject of mathematics plays an important role because in addition taught at all levels of education, mathematics can also be applied to various aspects of human life. According to Uzer (1993: 10) that a low student achievement, including mathematics achievement, can be caused by factors originating from within the students as well as factors outside the student.

The attitude of the students in the face of subjects including the one factor that comes from within the students that can influence learning achievement. Less appreciative attitude, negative and frustatifikasi the subjects could lead to a lack of interest, motivation, targets in following these lessons and will have an impact on the achievements. Yet according to Hudoyo (1998) that the math associated with abstract concepts that pemahamanya require high reasoning power, persistence, perseverance, attention, and motivation. All that can only be achieved if the student has an appreciative and positive attitude towards the subjects. According to Zohar and Marshall (2001: 57) that spiritual intelligence is the intelligence necessary for the functioning of IQ and EQ effectively. Spiritual intelligence (SQ) is the highest human intelligence. If spiritual intelligence possessed by the students they will be better able to understand the various issues or problems that arise during the learning process takes place in the school. Not only that, with spiritual intelligence students will be able to motivate yourself to study harder or studying in order to discover the meaning of the lessons given by the teacher. Spiritual intelligence also encourages students to be more creative that have creativity (creation) is high so that the learning achievement in school increases. Based on the results of an initial interview with the teacher Math Class XI MAN Kolaka second semester of the school year 2014/2015 suggests that some students consider mathematics as subjects daunting, tedious, and difficult to understand. The attitude in mathematics is very important to have the students, especially the math because math students' attitudes toward mathematics influence learning outcomes. Past research has linked is Marliani (2009), which examines the relationship attitudes of students in mathematics with mathematics learning achievement of students in SMP Negeri 1 Latambaga, showed that there is a positive and significant correlation between students' attitudes toward mathematics courses with mathematics achievement students.

B. Literature Review

Attitude is one of five (5) types of affective important characteristics, namely the attitudes, interests, self-concept, values, and morals (MONE, 2003: 4). Thurstone’s definition (in Marliani, 2009: 13) can be formulated that attitude includes several aspects:
1. Accept or reject or oppose
2. Values
3. Like it or not
4. Positive or negative toward an object of psychology.

According to Slameto (2003: 189) attitudes are formed through a variety of ways, among others:
1. Through the experience of repeated or accompanied by a profound feeling (the traumatic experience).
2. Through imitation, that imitation can occur without intentional or accidental.
3. Through suggestion, here someone to form an attitude towards an object without a reason and clear thinking, but solely because of the influence that comes from someone or something that has authority in his view.
4. Through identification, here someone imitating another example of an organization or a particular entity based on an emotional attachment to nature; imitate in this respect more in the sense of trying to match.

Based on some previous definitions can disimpulkkan that attitude in this study with regard to positive and negative reactions of students to math, whether it accepts or rejects, assess, and to like or dislike formed through experience, imitation, suggestion, and identification.

Spiritual intelligence is a boost circuit that drives a person to do the desires based on their goal of achieving good performance.

Spiritual understanding according to the experts:
1. According to Zohar and Marshall (2001: 57) spiritual intelligence is a necessary basis for the functioning of IQ and EQ effectively, even spiritual intelligence is our highest intelligence.

2. According to Agustian (2001: 57) spiritual intelligence is the ability to give meaning to any conduct worship and activities through the steps and thoughts that are whole human beings towards nature and patterns of thought and principled monotheism only because of God.

So spiritual intelligence or commonly called the SQ is the soul of wit that helps a person to develop his or her self through the creation of the possibility to implement positive values. According to Nasrun (in Marliani 2009: 6) that etymologically achievement interpreted as a result of the work that has been achieved with effort or obtained by working tenacity that can be measured by a test called. Furthermore Winkel (1984: 102), clarifies that learning achievement produced by students to bring changes in the ability of the aspects of knowledge, understanding, skills, and attitudes. The change was evident in academic achievement demonstrated by the student to questions and the assignment of teachers of subjects.

Based on the understanding that stated previously, the learning achievement is a measure of success, learning effort undertaken by students on a subject. This was determined after completing a test in relation to the subjects studied. In short, academic achievement can be regarded as final results have been achieved by someone after learning effort.

C. Methodology

1. Research Design
   This research included in the type of survey research in which researchers acts directly in the data retrieval by looking at students’ achievement and provides a questionnaire attitude for students and students’ spiritual intelligence. The study design as shown in the following figure.

   ![Diagram](image)

   **Figure 1.** Design of influences attitudes (X1) and spiritual intelligence (X2) on the mathematics achievement of students (Y).

2. Population and Sample
   The population in this study was all students of class XI MAN 1 Kolaka in the academic year 2014/2015, amounting to 104 students consisting of four classes namely IPA1 class was 23 people, totaling 24 students class IPA2, class IPS1 IPS2 totaling 26 people and totaled 31 students. From the population, sample was taken of 30% or 32 students. It is based on the Arikunto’s opinion (2002: 112) that when the subject of research of more than 100 samples, it can be 25% or more.

3. Technique of Data Collection
   a) Data collection techniques used in this study are as follows: Data obtained student attitudes by providing a questionnaire attitudes. By way mengedar sheet of questions to students who have as respondents to get the data the students’ attitude.
   b) Students’ spiritual intelligence data obtained by way of spiritual intelligence questionnaire mathematics to students. By distributing sheets of questions to students who have as a respondent to obtain data spiritual intelligence.
   c) Data mathematics learning achievement gained by engineering documentation class XI student grades MAN Kolaka first semester of the school year 2014/2015.

4. Instruments
   The instrument used to support researcher to collect data from respondents in the questionnaire form, i.e. questionnaires for students’ attitudes, and spiritual intelligence questionnaire. As for the students’ attitudes questionnaire that attitudes towards the purpose and content of mathematics courses, attitudes towards studying the subjects of mathematics, attitudes towards teachers who teach the subjects of mathematics, attitudes
towards the efforts to deepen the subjects of mathematics. While the questionnaire used in spiritual intelligence that is, about developing talent knowledge, wanted to get attention, and wanted to get compliments. While the mathematics achievement of students obtained from class XI student grades MAN Kolaka odd semester.

5. **Technique of Data Analysis**

Analysis of the data used in this research is analysis descriptive statistics and inferential statistical analysis. Both types of these techniques can be explained in the following points:

**a) Analisis Statistik Deskriptif**

Descriptive statistics were used to describe the state of the population in the form of the average, median, mode, minimum value, standard deviation, frequency distribution tables and percentages.

Determining the level of student attitudes used criteria proposed by Hadi (1997), namely:

<table>
<thead>
<tr>
<th>Category</th>
<th>Interval Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>(X + 1.5SD \leq X)</td>
</tr>
<tr>
<td>High</td>
<td>(X + 0.5SD \leq X &lt; X + 1.5SD)</td>
</tr>
<tr>
<td>Average</td>
<td>(X - 0.5SD \leq X - 0.5SD)</td>
</tr>
<tr>
<td>Low</td>
<td>(X - 1.5SD \leq X &lt; X - 0.5)</td>
</tr>
<tr>
<td>Very Low</td>
<td>(X &lt; X - 1.5SD)</td>
</tr>
</tbody>
</table>

Explanation:

- \(X\) = The scores obtained by students
- \(\bar{X}\) = The average of the total score
- \(SD\) = The Standard of Deviation

As for determining the level of spiritual intelligence and mathematics achievement class XI MAN Kolaka use the guidelines in the form of large-scale conversion of five that was developed by Suherman (2001) as listed in the table below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Interval score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>(X + 1.5SD \leq X)</td>
</tr>
<tr>
<td>High</td>
<td>(X + 0.5SD \leq X &lt; X + 1.5SD)</td>
</tr>
<tr>
<td>Average</td>
<td>(X - 0.5SD \leq X - 0.5SD)</td>
</tr>
<tr>
<td>Low</td>
<td>(X - 1.5SD \leq X &lt; X - 0.5)</td>
</tr>
<tr>
<td>Very Low</td>
<td>(X &lt; X - 1.5SD)</td>
</tr>
</tbody>
</table>

Explanation:

- \(X\) = Score from questionnaire
- \(X\) = Mean
- \(SD\) = Standard of Deviation

The minimum completeness criteria (KKM) subjects of math class XI MAN Kolaka is 70.

**b) Analisis Statistik Inferensial**

Inferential statistics used to test hypotheses of the study and inferential statistical regression analysis simple and multiple regression. It is intended to test the research hypothesis. General equation of simple linear regression as follows:

\[\hat{Y} = \alpha + bX\]

Where:
- \(\hat{Y}\) = the value of mathematics achievement
- \(\alpha\) = constant value
- \(b\) = coefficient

As for testing the significant use formula F Calculate using the formula:

\[F_{\text{count}} = \frac{\frac{R_{\text{reg}}(b/a)}{R_{\text{reg}}}}{\frac{1}{K_{\text{reg}}}}\]

(Riduwan, 2004: 146)

with a significant test criteria, namely

- If \(F_{\text{count}} \geq F_{\text{table}}\) means \(H_0\) is significant
- If \(F_{\text{count}} \leq F_{\text{table}}\) means \(H_a\) is not significant
with significance level of $F$ table is $\alpha = 0.05$

$$F_{table} = F_{(1-\alpha)(db\ reg\ (b/a)), (db\ res)}$$

As for the multiple linear regression equation used is:

$$\hat{Y} = \alpha + b_1 X_1 + b_2 X_2$$

Where:
- $\hat{Y}$ = the value of mathematics achievement
- $\alpha$ = constant value
- $X_1$ = students' attitude score
- $X_2$ = spiritual intelligence score
- $b_1$ = coefficients $x_1$ as predictor 1
- $b_2$ = coefficients $x_2$ as predictor 2

Testing the significance of multiple correlation coefficient with the following formula:

$$F_{count} = \frac{\sum_{i=1}^{n} (\bar{Y} - \hat{Y})^2}{\sum_{i=1}^{n} (Y - \bar{Y})^2} (Riduwan, 2004: 154)$$

Where:
- $n$ = number of respondent
- $m$ = number of independent variable

With multiple correlation significant test criteria:
- If $F_{count} \geq F_{table}$ then $H_0$ is rejected means significant.
- If $F_{count} \leq F_{table}$ then $H_a$ received means insignificant.

Additionally, it will be calculated using SPSS.

D. Finding and Discussion

1. Findings

a) Result of Descriptive Analysis

Based on research data obtained through questionnaires class XI student attitudes MAN Kolaka, obtained the lowest score of 50 and the highest was 70. The average value was 71.90, standard deviation was 7.68, median was 72.63, and mode amounting to 72.96. If the data is variable attitudes of students put in a category attitude, the obtained frequency distribution and percentage values as stated in the following table:

<table>
<thead>
<tr>
<th>Category of the Students' attitude of class XI MAN Kolaka</th>
<th>Interval score</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>$69.55 \leq X_1$</td>
<td>2</td>
<td>6.25%</td>
</tr>
<tr>
<td>High</td>
<td>$63.50 \leq X_1 &lt; 69.55$</td>
<td>7</td>
<td>21.88%</td>
</tr>
<tr>
<td>Average</td>
<td>$57.495 \leq X_1 &lt; 63.50$</td>
<td>9</td>
<td>28.125%</td>
</tr>
<tr>
<td>Low</td>
<td>$51.485 \leq X_1 &lt; 57.495$</td>
<td>11</td>
<td>34.375%</td>
</tr>
<tr>
<td>Very Low</td>
<td>$X_1 &lt; 5.485$</td>
<td>3</td>
<td>9.375%</td>
</tr>
</tbody>
</table>

According to the table 1 above, the attitude of the students are classified as very high category as much as 2 people or 6.25%, higher category as many as 7 people or 21.88%, moderate category as many as 9 people or 28.125%, the low category as many as 11 people or 34.375%, very low as many as 3 people or 9.375%.

Based on research data obtained through a questionnaire spiritual intelligence class XI MAN Kolaka, obtained the lowest score of 45 and the highest was 65. The average value was 69.5, standard deviation was 9.24, median was 77.5, and mode was 77.27. If the students' spiritual intelligence variable data entered into the category of spiritual intelligence, the obtained frequency distribution and percentage values as stated in the following table:

| Tabel 2. Category of the Students’ spiritual Intelligence of class XI MAN Kolaka |
|---------------------------------|--------------------------|-----------|----------------|
| Category                        | Interval score           | Frequency | Percentage (%) |
| Very High                       | $65.65 \leq X_2$         | 0         | -              |
| High                            | $60.46 \leq X_2 < 65.65$ | 12        | 37.5%          |
| Average                         | $55.27 \leq X_2 < 60.46$ | 11        | 34.37%         |
| Low                             | $50.08 \leq X_2 < 55.27$ | 6         | 18.75%         |
| Very Low                        | $X_2 < 50.08$            | 3         | 9.37%          |

32 100
Based on Table 2 above, spiritual intelligence of students who belong to the category of very high there, high category as many as 12 people or 37.5%, moderate category as many as 11 people or 34.37%, lower category as many as 6 people or 18.75% and very low category as many as four people or 9.37%.

The data showed that the lowest value of 70 and a high of 95. The average value of mathematics achievement class XI MAN Kolaka is 80.25, 79.5 Median, mode of 80.83 and a standard deviation 5.87. Award categories based benchmark mathematics achievement can be seen in the following table:

**Tabel 3. Category of the Students’ Achievement of class XI MAN Kolaka**

<table>
<thead>
<tr>
<th>Category</th>
<th>Interval Score</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>89.05 ≤ X2</td>
<td>3</td>
<td>9.375%</td>
</tr>
<tr>
<td>High</td>
<td>83.18 ≤ X2 &lt; 89.05</td>
<td>7</td>
<td>21.875%</td>
</tr>
<tr>
<td>Average</td>
<td>77.31 ≤ X2 &lt; 83.18</td>
<td>10</td>
<td>31.25%</td>
</tr>
<tr>
<td>Low</td>
<td>71.44 ≤ X2 &lt; 77.31</td>
<td>10</td>
<td>31.25%</td>
</tr>
<tr>
<td>Very Low</td>
<td>X2 &lt; 71.44</td>
<td>2</td>
<td>6.25%</td>
</tr>
</tbody>
</table>

| 32           | 100            |

Based on Table 3 above, it appears that the number of students whose academic achievement is classified as very high category amounted to 3 students, or 9.375%, higher category amounted to 7 students or 21.875%, the moderate category amounted to 10 students or 31.25% and low category 10 or 31.25% and a very low 2 or 6.25%.

**b) Result of Inferential Analysis**

Inferential analysis in this study is intended to test research hypotheses have been proposed. In order to test the hypothesis used simple regression analysis and multiple regression. Before the technique simple regression and multiple regression is used, prior testing requirements analysis, the normality test.

Before regression analysis, prior testing data normality which aims to see whether the variables in this case the variable X1 (students’ attitudes toward math class XI MAN Kolaka State), X2 (spiritual intelligence class XI MAN Kolaka) and Y (mathematics achievement class XI MAN Kolaka) derived from populations with normal distribution or not. Testing normality data were analyzed using Chi-square statistics. From the test results of the normality of the variables X1 obtained \( \chi^2_{count} = 3.0057 \) whilst \( \chi^2_{table} = \chi^2_{0.95;3} = 11.07 \). Thus \( \chi^2_{count} < \chi^2_{table} \), varibel X2 obtained \( \chi^2_{count} = 2.9402 \) whilst value of \( \chi^2_{table} = \chi^2_{0.95;3} = 11.07 \) Thus \( \chi^2_{count} < \chi^2_{table} \) and varibel Y obtained \( \chi^2_{count} = -95.6571 \) whilst the value of \( \chi^2_{table} = \chi^2_{0.95;3} = 11.07 \). Thus \( \chi^2_{count} < \chi^2_{table} \), it can be concluded that the data of spiritual intelligence and mathematics achievement of students come from normal distributed data.

Based on the analysis that has been done shows that the value of \( F_{count} (0.00005) > F_{table} (3.31) \). This means that, statistically not significant, which in other words H0. So we can conclude that the attitude and spiritual intelligence together no effect on mathematics achievement class XI MAN Kolaka, with multiple regression equation is:

\[
\hat{Y} = 3.023 + 0.515X_1 + 0.329X_2
\]

2. **Discussion**

Descriptive analysis showed that the average score of class XI student attitudes toward math Kolaka MAN is 60.5, the lowest score of 50, the highest score of 70, the standard deviation is 6.01, median of 58.5, and the mode of 56.5. Based on the criteria used in Table 1, it was concluded that students’ attitudes toward math is average. As for the results of the descriptive analysis of class XI student of spiritual intelligence MAN Kolaka shows that the average score of 57.87, the lowest score of 45, the highest score of 65, the standard deviation of 5.19, median of 65.3 and mode of 61.3 . Based on the criteria used in Table 2, spiritual intelligence class XI student of MAN Kolaka being categorized. The results of the descriptive analysis of student achievement class XI MAN Kolaka shows that the averages value of 80.25 the lowest score of 70 and a high of 95, a median of 79.5 for 80.3 modes, and standard deviation of 5.87. Based on the criteria used in Table 3, it can be concluded that the mathematics achievement of students of class XI MAN Kolaka amounted to 9.375% categorized as high.
The results of inferential analysis for predictors of students’ attitudes shows that the value of $F(20.62) > F_{table}(4.17)$, this means that $H_0$ is rejected or students’ attitudes toward math class XI MAN Kolaka can be said to be positive and significant impact on learning achievement math students. In addition to predictors of spiritual intelligence indicates that the value of $F(10.923) > F_{table}(4.17)$. This means that $H_0$ is rejected or spiritual intelligence math class XI MAN Kolaka can be said to be a significant positive effect on students’ mathematics achievement. Furthermore, for the predictors of students’ attitudes and spiritual intelligence collectively indicate that the value of $F_{count}(0.00005) < F_{table}(3.31)$. This means that, statistically significant influence but not at aua other words $H_0$. So we can conclude that the attitude and spiritual intelligence together influential but not significant to the mathematics achievement of students of class XI MAN Kolaka.

E. Conclusion

The results of inferential analysis for predictors of attitudes and spiritual intelligence class XI MAN Kolaka can be concluded influential but not significant to mathematics achievement at the $F_{hit} = 0.00005$ and $F_{tab} = 3.31$ with significance level $\alpha = 0.05$.

References


THE EFFECT OF THE CLASSROOM CLIMATE, STUDENTS' ATTITUDES, AND PERCEPTIONS ON MATH TOWARD THE ASSOCIATION MATERIAL LEARNING OUTCOMES THROUGH STUDENTS' MOTIVATION OF CLASS VII SMP IN THE DISTRICT OF KOLAKA

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Abstract

The Influence of The Classroom Climate, Students Attitude and Perception in Mathematics toward Mathematics Learning Outcomes through Learning Motivation of Class VII Student at SMPN in Kolaka. This research aimed to discover the description and the influence of classroom climate, student's attitude and perception in mathematics toward the association material learning outcome through learning motivation of class VII students at SMPN in Kolaka. This research was causality ex-post facto research. The sample and population of this research was the student of class VII of SMPN in Kolaka subdistrict with the total of 227 students in academic year of 2013/2014 chosen by using proportional cluster random sampling. The instruments of this research were: 1) classroom climate scale, 2) the students' attitude in mathematics scale, 3) the students' perception in mathematics scale, 4) learning motivation scale, 5) the test of mathematics learning outcomes in class VII. The data was analyzed by descriptive statistic and path analysis. The result of the research showed that: 1) 227 students of class VII at SMPN in Kolaka had: classroom climate was in high category, the students' attitude in mathematics was in high category, the students' perception in Mathematics was in high category, learning motivation was in high category, and the cognitive learning outcomes was in high category; 2) there were positive and significant influence of the classroom climate toward the students’ outcome directly and or indirectly through the students' learning motivation in mathematics ; 3) there were positive and significant influence of the students’ attitude in mathematics toward the students’ outcome directly and or indirectly through the students' learning motivation in mathematics; 4) there were positive and significant influence of the students' perception in mathematics toward the students' outcome directly and or indirectly through the students' learning motivation in mathematics; 5) there were positive and significant influence of the students' learning motivation toward the students’ outcome directly and or indirectly through the students' learning motivation in mathematics.

Keywords: Learning Outcomes of Mathematics, Classroom Climate, Learning Motivation, Perception in Mathematics and Students in Mathematics.

A. Introduction
Mathematics as a basic science is one of the subjects that play an important role in every level of education as a means of logical thinking, critical, analytical, rational and systematic. Because it is expected to provide basic mathematical thinking skills of students in other subjects and can be useful in everyday life.

But in fact the mathematics achievement in Indonesia showed unsatisfactory results. This can be seen by the results of Trend in International Mathematics and Science Study (TIMSS) and PISA. The mean mathematics achievement of Indonesian students at TIMSS 1999 is the 403
ranks 34th out of 38 participating countries. The mean mathematics achievement of Indonesian students in the TIMSS 2003 is the 411 ranks 36th out of 49 participating countries. Then, the average Indonesian student math achievement in TIMSS 2007 was 379 ranks 36th out of 49 countries in TIMSS 2011 Indonesia was ranked 38 out of 45 countries with a score of 386. This score has decreased when compared with 2007, at which time Indonesia ranks 36 of 49 countries with a score of 397. The mean mathematics achievement of Indonesian students in PISA 2000 was 367 ranks 39th out of 41 participating countries. Average student mathematics achievement in 2003 was 360 Indonesia is ranked 38 out of the 40 participants. The mean mathematics achievement of Indonesian students in PISA 2006 was 391 ranks 50 out of 57 participating countries, Indonesia in PISA 2012 is ranked 64 out of 65 participating countries with a value of 375 (Tiro, M. A, 2012).

We need to realize that although various attempts have been made to improve mathematics achievement of students as good as the curriculum, complete facilities, the ability of teachers to manage the learning process, would be meaningless if students are not serious in their learning activities. Seriousness of students in learning is determined by various factors. Many factors come from inside and outside the self-learners that affect learning outcomes in mathematics and also the limitations of the author in a variety of things such as cost, time, and abilities. The authors confine themselves to the study, namely Climate Class, attitudes and perceptions of students in mathematics and motivation to learn as internal factors that influence students’ mathematics learning outcomes.

The formulation of the problem in this study as follows.

1. How much influence the classroom climate, both directly and indirectly to the learning outcomes of association material through learning motivation Semester students of class VII SMP Negeri in District of Kolaka?
2. How much influence the attitudes of students in mathematics directly or indirectly to the learning outcomes of association material through learning motivation Semester students of class VII SMP Negeri at Kecamatan Kolaka?
3. How much influence the perception of students in mathematics directly or indirectly to the learning outcomes of association material through learning motivation Semester students of class VII SMP Negeri at Kecamatan Kolaka?
4. How much influence learning motivation to the learning outcomes of association material Semester students of class VII SMP Negeri at Kecamatan Kolaka?
5. How much influence the classroom climate, attitudes, and perceptions of students of association material directly or indirectly through the students' motivation Semester class VII SMP Negeri in district Kolaka?

Adapun tujuan dalam penelitian ini sebagai berikut.

1. To investigate how much influence the classroom climate, both directly and indirectly to the learning outcomes of association material through learning motivation Semester students of class VII SMP Negeri in District of Kolaka?
2. To investigate how much influence the attitudes of students in mathematics directly or indirectly to the learning outcomes of association material through learning motivation Semester students of class VII SMP Negeri at Kecamatan Kolaka?
3. To investigate how much the perception of students in mathematics directly or indirectly to the learning outcomes of association material through learning motivation Semester students of class VII SMP Negeri at Kecamatan Kolaka?
4. To investigate how much learning motivation to the learning outcomes of association material Semester students of class VII SMP Negeri at Kecamatan Kolaka?
5. To investigate how much the classroom climate, attitudes, and perceptions of students of association material directly or indirectly through the students’ motivation Semester class VII SMP Negeri in district Kolaka?

B. Literature Review

1. Learning Outcomes

According to Hamalik (2009: 30) that the learning outcomes are changes in a person’s behavior from not knowing to knowing, of not understand being understood. Changes in question is changes in knowledge, understanding, habits, skills, appreciation, emotional, social relationships, physical, ethical or moral character, and attitude. Ratumanan (2004: 5) argues that the cognitive learning is the learning outcomes related to thinking, knowing, and solve problems.
So it can be concluded that the cognitive learning is the result obtained after the students learn the material presented in the learning process. Math means learning outcomes (cognitive domain) is the result of the learning process of mathematics, which can be expressed in value or semester exam math test scores.

2. Classroom Climate
   Classroom climate is a broad concept, which includes mood (feeling) or the atmosphere created by the class teacher with the rules set forth, the way teachers interact with students, and how the physical environment is managed (Freiberg and Stein, 1999; Creemers & Reezit 1999 in Muijs Daniel & David Reynolds, 2008: 165). A crucial aspect of classroom climate is the relationship between teachers and students and among students.
   According to Moos (Widoyoko, 2012: 193), classroom climate has three general dimensions that can be used to measure psychological and social environment. The third dimension is the dimension of the relationship (relationship), the dimension of personal growth and development (personal growth / development), and the dimensions of change and improvement of the system (system maintenance and change). The relationship dimension measure the extent of the involvement of students in the classroom, the extent to which learners mutually supportive and helpful, and the extent to which they can express their abilities freely and openly. These dimensions include affective aspects of interaction between students and between students and teachers. Scales classroom climate that is included in this dimension is the compactness (cohesiveness), satisfaction (satisfaction) and engagement (involvement). Compactness (cohesiveness) measures the extent to which students identify, help and support each other.

3. Students’ Attitude toward Math
   Attitude is the internal dimension affective symptoms such as a tendency to react or respond (response tendencies) in a relatively fixed to the object of people, goods, and so forth (Muhibbin Shah, 2007: 149). Dimyati & Mudjiono (2006: 239) argue that the attitude is the ability to pass judgment on something that brings in accordance to assessment. Their judgments about things resulted in the attitude to accept, reject, or ignore. Students have the opportunity to learn, but students can accept, reject, or ignore the opportunity to learn it. The structure consists of three components attitude of mutual support the cognitive component (cognitive), the affective component (affective), and conative component (conative).

4. Students’ Attitude toward Association Materials
   Branca in Bimo Walgito (2010: 100) suggests that the perception of an organization, with the interpretation of the stimulus on the senses that is a good thing, and an integrated response within the individual. Therefore, in sensing people will associate with the object. With perceptions of individuals will be aware of his surroundings and also the state itself. Because perception is an activity that is integrated within the individual, then what inside people will participate actively in perception is. Based on this, the perception can be put forward for feeling, thinking skills, individual experiences are not the same, then in perceiving something stimulus, the result might have been different perceptions between one individual with another individual.
   Based on these discussions, the researcher concluded that the perception is the response of a picture or image of an object obtained by the individual through the senses, then organized, interpretation, and evaluated, so as obtain the meaning (sense) of an object.

5. Learning Motivation
   In learning activities, motivation can be considered as the overall driving force within the students who lead learning activities, which ensures continuity of learning activities, so that the desired destination by a subject of study that can be achieved (Sardiman, 2011: 75). According to Uno (2012: 23) motivation to learn is internal and external encouragement to students who are learning to hold a change of behavior in general.

6. Research Hypotheses
   The following are the hypotheses that are used in this study:
1. Classroom climate positively and significantly impacts on learning outcomes of mathematics either directly or indirectly through the motivation to learn.
2. The attitude of the students on the mathematics positively and significantly impacts on learning outcomes of mathematics either directly or indirectly through the motivation to learn.
3. Perception of students on the mathematics positively and significantly impacts on learning outcomes of mathematics either directly or indirectly through the motivation to learn.
4. Motivation to learn positively and significantly impacts on learning outcomes in mathematics.
5. Attitudes and Perceptions of students on mathematics together positively and significantly impact on learning outcomes of mathematics either directly or indirectly through the motivation to learn.

C. Methodology

1. Research Design
   This research was ex-post facto nature of causality. The researcher will explore the causal relationship (causal) and test hypotheses that have been formulated previously, namely: climate class, attitudes and perceptions of students in mathematics and motivation to learn the mathematics learning outcomes.

2. Population and Sample
   The population in this study were all students of class VII SMP Negeri in District Kolaka 2013/2014 academic year, as many as three schools namely SMP Negeri 1 Kolaka, SMP Negeri 2 Kolaka, SMP Negeri 3 Kolaka by the total number of students from each school are especially class VII is 571 students. The sampling method used to obtain a random sample and can represent the characteristics of the population to the purpose of this research is to use the technique of proportional cluster random sampling with a sample size of this study was 227 students.

3. Collection and Data Technique Analysis
   The data collection is done by using achievement test and questionnaire. Achievement test made by material indicators set, while the questionnaire prepared by the scale of measurement consisting of classroom climate scale, a scale of student attitudes on Mathematics, scale perceptions of students in math, and learning motivation scale. An alternative answer on a scale that is used consists of Strongly Agree (SS), Agree (S), Ragu-Ragu (RG), Disagree (TS), Strongly Disagree (STS) (Widoyoko, 2012: 106). The scoring on this scale ranging from 1-4 based on the items that are favorable and unfavorable. For items that are favorable score answers SS = 5, S = 4, RG = 3, TS = 2, STS = 1. For items that are unfavorable score answers SS = 1, C = 2, RG = 3, TS = 4, STS = 5. Analysis of the data used in the study was descriptive and inferential statistics. Descriptive statistics is required to describe the data of the variables of the proposed research includes the mean, median, variance, skewness, kurtosis, minimum, maximum, and percentage analysis. Inferential statistics was for the purpose of analysis and validation of the proposed model and hypothesis testing. Therefore, the technique was used path analysis using the program package AMOS (Analysis Of Moment Structure) IBM IBM SPSS version 20.0 and version 20.0.

D. Finding and Discussion

1. Findings
   Based on the results of descriptive statistical analysis showed that in general the average score obtained by the students of class VII Junior High School in the district of Kolaka are: for the class amounted to 53.74 climatic variables that are in the category of "high", the average score of students’ attitude on amounting to 67.17 that are in the category of "good", the average score on the math student perception of 65.07 that are in the category of "good", and the average score of 68.68 learning motivation that are in the category of “high” and an average score of 75.57 mathematics learning outcomes that are in the category of "high".
   Based on the calculation results of path analysis using SPSS 20, then the path diagram for the analysis of decomposition model, as follows:
2. Discussion

Based on the results of testing the first hypothesis suggests that climate class positive and significant impact directly on learning outcomes of mathematics with path coefficient value of 0.18, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 9\%, and indirectly (through motivation learning) with a path coefficient value of 0.11, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 21\%, these results are supported by the results of research conducted by Wahyudi (2003) proved that there is strong correlation between student achievement in a class with moods or social environment created in the class. This is in line with the opinion of Hadiyanto and Subianto (Widoyoko, 2012: 191) states that the classroom climate that is conducive to be able to create fruitful interaction among learners, foster the spirit which enables activities in the classroom is going well and support the understanding between teachers and participants learners.

The second hypothesis testing results show that students perform mathematical positive and significant impact directly on learning outcomes of mathematics with path coefficient value of 0.31, \( p = 0.001 < \alpha = 0.005 \) or contributed by 17\%, and indirectly (through motivation to learn) with the path coefficient value of 0.13, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 23\%. This is in line with the opinions expressed Aunurrahman (2009: 179) The attitude of student learning will be realized in the form of feeling happy or not happy, agree or disagree with these things. Feeling happy or not is what will build students' motivation in learning, so that students who have an attitude of willingness to accept or emotionally to learn the students' motivation will be higher as well. This kind of attitude will affect motivation for learning outcomes are achieved. Something that creates a feeling of pleasure, tend to be repeated.

Based on the results of testing the third hypothesis suggests that the perception of students on the mathematics positive and significant effect directly on the results of students' mathematics learning with path coefficient value of 0.41, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 23\%. and indirectly (through motivational learning) with a path coefficient value of 0.16, \( p = 0.001 < \alpha = 0.005 \) or contributed by 25\%. Also in line with the opinion of Thoha (2002: 155) argues that the motivation that are there in a person will determine how a person’s perception in addressing the object or situation is concerned, perception has a great influence on their motivation and vice versa motivation may also affect perception.

Based on the results of the fourth hypothesis testing showed that motivation to learn positive and significant impact on learning outcomes of the mathematics class VII SMP Negeri in District Kolaka with path coefficient value of 0.42, \( p = 0.001 < \alpha = 0.005 \) or contributed by 29\%, in line with the opinion of Travers (Ratumanan, 2004: 85) argues that the motivation can result in a person doing an activity, can push their physical changes, emotional changes, changes in one's perceptual and cognitive changes.
Meanwhile, Ratumanan (2004: 87) argues that in teaching and learning, motivation can function as business drivers of learning and achieving better learning outcomes. Based on the results of the fifth hypothesis testing showed that the attitudes and perceptions of students on mathematics together positive and significant impact directly on learning outcomes of students’ mathematics class VII Negeri in districts Kolaka with path coefficient value of 0.30, \( p = \alpha = 0.005 \) or contributed by 15\%, and indirectly (through motivational learning) with a path coefficient value of 0.29, \( p = \alpha = 0.005 \), or a contribution of 14.5\%. This is in line with the opinion of Lindgran (Nurdin, 2006) suggests that the student’s behavior (motivation to learn) is determined by the perception within the individual, the behavior will change. Furthermore, Narang (Nurdin, 2006) suggests that learning achievement is the overall behavior of individuals is determined partly by the perception.

E. Conclusion
1. Descriptive analysis showed that the attitude of students in mathematics and perceptions of students in mathematics as well as the motivation to learn to be in the high category of the five categories set. Likewise with math learning outcomes Junior High School seventh grade students in the district of Kolaka are in the high category of the five categories set.
2. Classroom Climate positively and significantly impacts directly on learning outcomes of mathematics with path coefficient value of 0.18, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 9\%, and indirectly (through motivational learning) with coefficient lanes of 0.11, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 21\%.
3. The attitude of the students on the mathematics positive and significant impact directly on learning outcomes of mathematics with path coefficient value of 0.31, \( p = 0.001 < \alpha = 0.005 \) or contributed by 17\%, and indirectly (through motivational learning) with path coefficient value of 0.13, \( p = 0.001 < \alpha = 0.005 \) Perception of students on the mathematics positive and significant impact on the students motivation in class VII SMP Negeri districts Kolaka. The amount of direct influence on the students’ perception on motivation to learn math by 23\%.
4. Perceptions of students in mathematics positive and significant effect directly on the results of students' mathematics learning with path coefficient value of 0.41, \( p = 0.001 < \alpha = 0.005 \) or a contribution of 23\%. and indirectly (through motivational learning) with a path coefficient value of 0.16, \( p = 0.001 < \alpha = 0.005 \) or contributed by 25\%.
5. Motivation to learn positive and significant impact on learning outcomes of the mathematics class VII SMP Negeri in District Kolaka with path coefficient value of 0.42, \( p = 0.001 < \alpha = 0.005 \) or contributed by 29\%.

References


COMPARATIVE STUDY OF THE STUDENTS’ MATH LEARNING OUTCOMES TAUGHT USING TYPE OF COOPERATIVE LEARNING METHOD NUMBERED HEAD TOGETHER (NHT) AND GAMES TEAM TOURNAMENT (TGT) TO STUDENTS CLASS VII SMPN 1BAULA

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Abstract

The problems in this research are: (1) What is the result of learning mathematics in grade VII SMP Negeri 1 Baula taught by type of cooperative methods Numbered Heads Together (NHT)? (2) What is the result of learning mathematics in grade VII SMP Negeri 1 Baula taught by type of cooperative methods Team Games Tournament (TGT)? (3) Are the results of students’ mathematics learning kelas VII SMP Negeri 1 Baula taught by cooperative methods with NHT different with students who are taught by the type cooperative method TGT? The hypothesis in this study are: the results of students’ mathematics learning class VII SMP Negeri 1 Baula taught by cooperative methods NHT type is different with the students taught with methods TGT. The population in this study was all students of class VII SMP Negeri 1 Baula in the second semester of the 2011/2012 academic year. Samples taken as many as two classes, namely class VIIc and VIId class. The results showed: (1) The results of students’ mathematics learning of class VIIc are taught using cooperative learning NHT type obtained an average value of student learning outcomes at 82.86 and the passing rate of 100%. (2) Results of mathematics learning of class VIId taught using methods TGT obtained average value result of 67.25 and the percentage of students passing at 80%. (3) The results of hypothesis test obtained \( t_{\text{count}} > t_{\text{table}} \) or equal to 3.997 > 2.02 with df = 39 at significance level \( \alpha = 0.05 \). Thus, it can be concluded that there were significant differences in the results of students’ mathematics learning that are taught using NHT and IGT methods in the seventh grade students of SMP Negeri 1 Baula.

Keywords: mathematics learning outcomes, the NHT model, TGT model

A. Introduction

The success of the student learning process is determined by several factors, among others, intelligence, training, motivation, tools used in teaching and learning, environment, family factors, methods of teaching and learning the subject (teachers and students). To help students for successful learning, teachers must pay attention to the factors that influence the success of students and also first need to know the purpose of the lesson material being taught. Soedjadi in Ikhanudin (2010: 2) Math that has abstract objects might be said "opposite" to the intellectual development of children. Besides, the order presentation materials in mathematics is usually done so far by the teacher in the learning process are (1) taught theory / definition / theorem, (2) given examples, (3) given exercises. In this kind of learning students are likely to receive and copy definitions and examples that teachers give. The lack of students’ achievement in math, maybe also due to efforts of teachers to improve learning achievement has not gone as...
expected.

Innovation in the learning process is needed to improve the achievement of the maximum. This innovation can be done by using some learning approaches, learning strategies, and learning models. The models of learning undertaken by teachers have a very important role in the education successfullness. The use of the right model will determine the effectiveness and efficiency of the teaching process, in addition to the teacher always be able to select and apply those appropriate methods that fit to the materials taught.

In mathematics, there are several methods that have been used by teachers include lectures, question and answer method and some of these methods may be regarded as conventional methods. Conventional learning model that is used by the majority of teachers are not in accordance with the demands of time this is evidenced by the low learning results obtained by the students, where the average obtained by the student at 50 is far below KKM determined by the school. This is because learning do not provide as much opportunity as possible for the student to construct knowledge.

Achievement of learners, their confidence, their behavior, and attitudes toward school, and relationships between individuals and groups of learners are all influenced by learning methods are applied in the classroom (Walkerdan Crogan in Ikhanudin, 2010: 4). In education, there are several models of learning that already exist for the teachers, especially for junior high school teacher, where this model can be used to enhance the activity of the learners in learning process among other models such as guided discovery, problem-solving model, learning model portfolios, and cooperative learning model, in a cooperative learning model, there are several types, namely the type of Investigation Group (Group investigation), Jigsaw, type Student Teams Achievement Divisions (STAD), type Teams Games Tournament (TGT), Learning Together (Learning together), Numbered Heads Together (NHT), etc.

The learning models involves the activities of all learners without any distinction of status, engage learners as peer tutors and contains elements of the game. Learning activities are designed such as to allow for the learners can learn more relaxing and enjoyable. It is also can foster a sense of responsibility, teamwork, healthy competition, and learning engagement. Through the study group is expected to activate learners in mathematics to increase achievement, for learners to actively participate and may obtain additional information from the groups. Thus, learning is able to enhance understanding for students in Junior High Schools. From some model of learning, the writer interested to compare the learning outcomes of students who are taught by the method of type Numbered Heads Together (NHT) with type Teams Games Tournament (TGT), so this research entitled "Comparative Study of the Students’ Math Learning Outcomes Taught Using Type of Cooperative Learning Method Numbered Head Together (NHT) and Type Games Team Tournament (TGT) to Students Class VII SMPN 1 Baula".

B. Literature Review
1. Numbered Heads Together(NHT)
This is one of the structural methods in cooperative learning. NHT was developed by Spencer Kagan (Yulianingsih, 2010: 11) to engage students in looking back at the material covered in the lesson and check their understanding of the lesson content. In line with a direct question to the whole class, teachers use a four-step structure, is as follows:
   a. Step 1 – Numbering
      The teacher divides the students into groups or teams of 3 to 5 people and gives them numbers so that each student on the team has a different number.
   b. Step 2 - Asking Questions
      Teachers ask questions to the students. Questions can be varied, from the specific to the general.
   c. Step 3 - Think Together
      All members of the group discussed the questions given by the teachers and make sure each member knows the answer to those questions.
   d. Step 4 - Providing Answers
      Teachers mention a number and the students of each group with the same number of hand-picked and prepare answers to the entire class.
      The team consists of varies students, namely: there is a high caliber, capable of being, and poor performance. Here positive dependence was also developed, and the ability to lower helped by the ability to more. High-ability students who are willing to help, even though they were not called upon to answer. The poor level students are expected very enthusiastic
understand the issues and answers.
The group division at NHT method is based on ability and gender.

2. Team Games Tournament (TGT)

Nur in Zuliyani (2010: 6) suggested that TGT learning method is learning the same techniques as in every stage of learning STAD except in one phase that instead quiz and individual improvement scores system, TGT using academic game tournament. Students compete in the tournament representing his team with other team members that are the same level of their last academic rank.

TGT learning method is one type or model of cooperative learning that is easy to implement, involving the activities of all students without any differences in status, involves the role of students as peer tutors and contain elements of games and reinforcement. Slavin (Zuliyani, 2010: 6-7)

Slavin (Zuliyani, 2010: 6-7) state the main component in learning TGT is:
a. Classroom presentations
At the beginning of learning the teacher presenting material in class presentation, usually done by direct teaching or by lectures, discussions led by teacher. At the time of presentation, the students are expected to be right and really pay attention and understand the material submitted by teachers, as it will help students perform better at work and the group at the time of the game because the game score will determine a score group.
b. Group
The group usually consists of 4 to 5 students whose members' heterogeneous views of academic achievement, the different sex and ethnic. The function of the group is to further explore the matter with friends group and more specifically to prepare group members in order to work properly and optimally during the game.
c. Game
Game consists of questions designed to test students' knowledge gained from classroom presentations and study groups. Most of the game consists of simple questions numbered. Students select the numbered cards and try to answer the questions that correspond with that number. Students who answer the question correctly will receive a score.

C. Methodology
1. Research Design
Research will be conducted in two classes with different treatment. The procedures to be performed in the determination of the class are:
a. Determine which class will be taught by type NHT and TGT.
b. Then the teachers will implement the learning according to the learning steps contained in the type of learning that has been determined. Thus the differences in learning outcomes will be considered to arise from the treatment given.
c. After learning the treatment is done, the next is to provide a written exam tests to be done by the students.
d. After the learning process are grouped group is completed, the next step is to provide a test in the form of questions that will be done by each student individually, the teacher will examine the results of student work and test data both groups will be conducted comparative tests to determine whether there is a difference and if there are differences as well as determine which classes that have a higher learning outcomes.
e. Because in this study students in different classes will be given treatment that is different i.e. NHT type cooperative learning methods and TGT that can be seen in the following table:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Methods</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>KE₁</td>
<td>X₁</td>
<td>V</td>
</tr>
<tr>
<td>KE₂</td>
<td>X₂</td>
<td>V</td>
</tr>
</tbody>
</table>

Explanation:
KE₁ : Group of the experimental class 1
KE₂ : Group of the experimental class 2
X₁ : Treatment 1 (cooperative type NHT)
2. **Population and sample**

The population in this study was all students in grade VII SMP Negeri 1 Baula, the second semester of the Academic Year 2014/2015 that consists of four classes. Which in this study, there are two classes that are selected as a sample of class VIIc that consists of 21 students will be treated with the method of learning NHT and class VIIid consisting of 20 students learning to be treated with IGT.

3. **Data Collection Technique**

The data collection technique is an activity to acquire the data needed to be processed and presented based on the problem faced. Data used in this research is data result of the students’ learning mathematics of SMP Negeri 1 Baula. Data collection techniques were performed using the test, data collection techniques in the form of tests used to collect data from students’ mathematics learning after being given the subject matter of mathematics.

4. **Research Instrument**

Instruments used in this research was to test the ability to complete math problems, where there were two classes given different treatment.

5. **Data Analysis Technique**

Analysis of the data in this study using the ready-made program SPSS version 20.0 and Microsoft Excel 2007.

a. **Validity Test of Instrument**

The validity of the items used to measure the support score each item on the total score. The greater the support score items to the total score, the higher the validity of the question. Thus, to test the validity of any items, then score each item on correlated with the total score using the formula RPBBI (correlation coefficient point biserial) with the following formula:

\[ r_{pbi} = \frac{Mp - Mt}{SDt} \sqrt{\frac{p}{q}} \]  
(Awalluddin, 2008:9)

Explanation:
- \( r_{pbi} \) = point correlation index number biserial
- \( Mp \) = mean scores of subjects who answered true / yes
- \( Mt \) = total mean
- \( SDt \) = total Standard of deviation
- \( p \) = the proportion of subjects that are answered true / yes
- \( q \) = 1 - p

Statistical hypothesis tested was.
- \( H_0 \rho = 0 \), there is no significant relationship between the score of items with a total score
- \( H_1 \rho \neq 0 \), there is significant correlation between the score of items with a total score

The test criteria is if a probability value (sig.) Is less than 0.05, then \( H_0 \) is rejected and vice versa, then \( H_0 \) is accepted. In addition, Masrun (1979) in Sugiyono (2012: 134) states that the minimum requirement is said to be valid if \( r = 0.3 \).

Interpretation of the magnitude of the correlation coefficient \( r_{xy} \) is based on the opinions Arikunto (2009: 75), as Table 12 below.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.80 &lt; ( r \leq 1.00 )</td>
<td>Very High</td>
</tr>
<tr>
<td>0.60 &lt; ( r_{xy} \leq 0.80 )</td>
<td>High</td>
</tr>
<tr>
<td>0.40 &lt; ( r_{xy} \leq 0.60 )</td>
<td>Enough</td>
</tr>
<tr>
<td>0.20 &lt; ( r_{xy} \leq 0.40 )</td>
<td>Low</td>
</tr>
</tbody>
</table>
b. Reliability Test

Analysis of reliability of the test is to measure the coefficient of reliability and are used to determine the level of reliability of a test. A test is said to be reliable if the results of measurements made using such tests repeatedly on the same subject, always shows the results remain the same or nature stable or steady (consistent).

The coefficient of multiple choice instrument using the formula K-R. 20 as follows:

$$r_{11} = \left( \frac{n}{n-1} \right) \left( \frac{S^2 - \sum pq}{S^2} \right)$$

(Arikunto, 2009: 100)

Explanation:
- $r_{11}$ = reliability in over all
- $p$ = the proportion of subjects who answered the item correctly
- $q$ = the proportion of subjects that are answered the item incorrectly
- $\sum pq$ = the amount of the multiplication of $p$ and $q$
- $n$ = number of item
- $S$ = standard deviation of the test

Interpretation of the coefficient of reliability of the test used is the interpretation according to J.P Guilford (Suherman, 2003: 139) as shown in Table 17 below:

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.90 ≤ $r_{11}$ ≤ 1.00</td>
<td>Very High Reliability</td>
</tr>
<tr>
<td>0.70 ≤ $r_{11}$ &lt; 0.90</td>
<td>High Reliability</td>
</tr>
<tr>
<td>0.40 ≤ $r_{11}$ &lt; 0.70</td>
<td>Enough Reliability</td>
</tr>
<tr>
<td>0.20 ≤ $r_{11}$ &lt; 0.40</td>
<td>Low Reliability</td>
</tr>
<tr>
<td>$r_{11}$ &lt; 0.20</td>
<td>Very Low Reliability</td>
</tr>
</tbody>
</table>

c. Descriptive Analysis

Descriptive analysis is intended to describe the characteristics of respondents by the independent variable of learning model Numbered Heads Together and Tournament Team Games on the dependent variable with the average value of students' mathematics learning outcomes of each cell, standard deviation, minimum and maximum values.

d. Inferential Analysis

Because in this study there are two groups that are given different treatment, namely the provision of using cooperative learning NHT type and TGT type hypothesis testing performed using $t$-test one, which is to determine which of the results of the class has the highest score.

The use of statistical test techniques of analysis of variance and covariance require certain requirements that must be met namely data normality and homogeneity of the sample.

1. Normality Test

Normality test is intended to determine whether the research data are normally distributed. Normality test used was chi-square with the formula:

$$\chi^2 = \sum_{i=1}^{k} \frac{(f_o - f_e)^2}{f_e}$$

(Riduwan, 2003: 197)

Explanation:
- $f_o$ = observed frequency
- $f_e$ = expected frequency
- $i$ = number of lines
- $k$ = class interval

Testing criteria:
- jika $\chi^2$ count ≥ $\chi^2$ Table distribution is not normal
2. **Homogeneity Test**

Homogeneity test data in this study using a test greatest variance compared with the smallest variance as follows:

$$f_{hitung} = \frac{\text{varians terbesar}}{\text{varians terkecil}}$$

Riduwan (2003: 186)

Comparing the value of $f_{hitung}$ with $f_{table}$ using formula:

- $df_{denominator} = n - 1$ (for the biggest variance)
- $df_{denominator} = n - 1$ (for the smallest variance)

Significant level $\alpha = 0.05$, found out at table $f$
- If $F_{count} > F_{table}$ means not homogeneous
- If $F_{count} < F_{table}$ means homogeneous.

3. **Hypotheses Testing**

**Independent Sample t-test**

If based on the results of homogeneity of the two populations examined was homogeneous then apply the following formula t-test:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Sugiyono (2011:80)

Explanation:
- $t$ = Value of statistical test
- $\bar{X}_1$ = Average of students’ learning outcomes (experimental class I)
- $\bar{X}_2$ = Average of students’ learning outcomes (experimental class II)
- $n_1$ = The number of samples (the experimental class I)
- $n_2$ = The number of samples (the experimental class II)
- $S_{1}^2$ = Data Variance (experimental class I)
- $S_{2}^2$ = Data Variance (experimental class II)
- $SP^2$ = Mixed Standard Deviation value

Testing Criteria:
- Jika $t_{count} > t_{table}$ $H_0$ rejected.

D. **Finding and Discussion**

1. **Findings**

Test the validity of the other class do not constitute experimental class (class VII SMPN 1 Wundulako 3). The test consists of 24 items and about 24 students. Calculation test the validity of test, if $r_{hit} > r_{tab}$ the matter declared invalid item. Of the 24 questions that tested there are 20 items about valid and four items about invalid. Item about invalid is a matter of item numbers 3,14,19, and 21. To see the calculation results SPSS can be found in appendix 3. Once the validity test is done, the invalid item will be deleted to continue the reliability test. An instrument had a reliability study indicated sufficient if Kudher Ricadson 20 (KR-20) greater or equal to 0.70. From the test results on a computer obtained Kudher Ricadson 20 (KR-20) amounted to 0.930, thus it can be concluded that this matter is reliable to measure student learning outcomes.

Normality test is performed to determine whether the sample data is taken from the normal population or not. Normality test is done with the aid of a computer program SPSS using the quadratic formula $\chi^2$ (chi-square = SPSS). Samples were said to come from normal populations if $\chi^2_{count} < \chi^2_{table}$. Normality test results can be seen in the following table:
Table 4. Summary results of the test for normality

<table>
<thead>
<tr>
<th>Class</th>
<th>$\chi^2_{count}$</th>
<th>Df</th>
<th>$\chi^2_{table}$</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHT</td>
<td>10,00</td>
<td>6</td>
<td>12,59</td>
<td>Normal</td>
</tr>
<tr>
<td>TGT</td>
<td>4,00</td>
<td>5</td>
<td>11,07</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Data $\chi^2$ at the table above can be explained as follow:

1. $\chi^2_{count} < \chi^2_{table} = 10,00 < 12,59$, means the sample derived from the normal population.
2. $\chi^2_{count} < \chi^2_{table} = 4,00 < 11,07$, means the sample derived from the unnormal population.

Homogeneity test is performed to determine whether the population has the same variance or not. Significance level was set at 0.05. The population is said to be homogeneous if the significance level is greater than the level of significance was set or if $F_{count}$ (levene statistical value) is smaller than $F_{table}$ then the population is also said to be was homogeneous. Homogeneity test results can be seen in the following table:

Table 5. Summary Result of Hogeneity Test

<table>
<thead>
<tr>
<th>Class</th>
<th>$F_{count}$</th>
<th>$F_{table}$</th>
<th>$\alpha_{gained}$</th>
<th>$\alpha_{stable}$</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHT</td>
<td>0,534</td>
<td>4,09</td>
<td>0,469</td>
<td>0,05</td>
<td>Homogene</td>
</tr>
</tbody>
</table>

The hypothesis is an answer to the question or problem in the study. The hypotheses in this study are:

$H_0$ = math learning outcomes of class VII SMP Negeri 1 Baula taught by cooperative method with the type Numbered Heads Together (NHT) is not different with the students taught by the type cooperative methods Team Games Tournament (TGT).

$H_a$ = learning outcomes math class VII SMP Negeri 1 Baula taught by cooperative method with the type Numbered Heads Together (NHT) is different from the students taught by the type cooperative methods Team Games Tournament (TGT).

If $T_{count} < T_{table}$ then $H_0$ is accepted and $H_a$ rejected, otherwise if $T_{count} > T_{table}$ then $H_0$ rejected and $H_a$ accepted.

Before performing the following hypothesis test result data grade students VIIc and VIIId SMP Negeri 1 Baula that are subjected to different learning. Here are the results VIIc classroom learning with NHT type cooperative method:

Table 6. The frequency distribution of learning outcomes with a group of NHT type cooperative Method

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>%</th>
<th>% Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>9.5</td>
<td>9.5</td>
</tr>
<tr>
<td>70</td>
<td>2</td>
<td>9.5</td>
<td>19.0</td>
</tr>
<tr>
<td>75</td>
<td>1</td>
<td>4.8</td>
<td>23.8</td>
</tr>
<tr>
<td>80</td>
<td>7</td>
<td>33.3</td>
<td>57.1</td>
</tr>
<tr>
<td>90</td>
<td>5</td>
<td>23.8</td>
<td>81.0</td>
</tr>
<tr>
<td>95</td>
<td>1</td>
<td>4.8</td>
<td>85.7</td>
</tr>
<tr>
<td>100</td>
<td>3</td>
<td>14.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Total 21 100.0

The results of students’ mathematics learning in the class is a class VIIc with NHT type cooperative learning method that consists of 21 students showed an average of study results at 82.86 with a minimum value of 60, the maximum value of 100 and a standard deviation of 11.79.
The frequency distribution of learning outcomes with Method type cooperative group TGT

<table>
<thead>
<tr>
<th>Value</th>
<th>45</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>23.8</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>95.2</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>80</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The results of students' mathematics learning in the class is a class with a method VIIc cooperative learning TGT consisting of 20 students showed an average of study results at 67.25 with a minimum value of 45, the maximum value of 90 and a standard deviation of sebesar13,33

Further testing conducted by independent sampl-test conducted with the help of computer analysis using SPSS 17.0 statistics, so we get the following results:

<table>
<thead>
<tr>
<th>Class</th>
<th>$t_{count}$</th>
<th>df</th>
<th>$t_{table}$</th>
<th>A</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHT</td>
<td>3,977</td>
<td>39</td>
<td>2,02</td>
<td>0,05</td>
<td>There is difference</td>
</tr>
<tr>
<td>TGT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Explanation:
df : Degree of Freedom
α: Significance level

Based on the results of hypothesis testing using t-test, obtained $t_{count}$ variable student learning outcomes at 3,977 with df = 39, df those of the 5% significance level obtained $t_{table}$ by 2.02.

From these data indicate that $t_{count} > t_{table}$ so then H0 rejected and Ha accepted. Alternative Hypothesis (Ha) which states that "the results of students' mathematics learning class VII SMP Negeri 1 Baula taught by cooperative methods with NHT is different with students who are taught by the type cooperative method TGT".

2. Discussion

Student learning outcomes data above shows that the application of NHT type cooperative method can provide better learning outcomes for students of SMP Negeri 1 Baula when compared to the type cooperative method TGT. It is shown from the results of hypothesis testing is done at the top, where the most accepted hypothesis states that there are differences in learning outcomes between the two methods of teaching and learning.

In addition we can also see from the average value of students in the class VIIc (NHT type cooperative method) amounted to 82.86 were in class VIId (TGT type of cooperative method) amounted to only 67.25. In addition the percentage of graduation with the KKM = 60, for VIIc grade passing rate of 100% and the class VIId passing rate of only 80% (4 out of a total of 20 students have not reached the standard KKM).

Thus, we may conclude that the results of student learning class VIIc with the implementation of cooperative learning methods NHT better than grade students VIId are taught using cooperative learning TGT this is in line with research conducted by Yulianingsih (2010: 45) states that NHT cooperative learning model can improve students' mathematics learning outcomes.

E. Conclusion

From the results of data analysis and discussion conducted can be drawn the following conclusions:

1. The results of students in a given kelasVIIc treatment NHT type cooperative learning methods are: the average value of 82.86 by the number of students at least 21 people, the
maximum value obtained is 100 and the minimum score is 60. The standard deviation of 11.79 and the passing rate of 100% (KKM = 60).

2. The results of students in the class VIIId given treatment TGT cooperative learning methods are: the average value of 67.25 by the number of students as many as 20 people, the maximum value obtained is 90 and the minimum score is 45. The standard deviation of 13.33 and the passing rate of 80% (KKM = 60).

3. There are significant differences in learning outcomes between the use of mathematical methods and the type cooperative NHT type cooperative TGT using seventh grade students of SMP Negeri 1 Baula, where tcount > TTable or 3.977 > 2.02 and a 100% passing rate for NHT and 80 % for TGT.

References


THE ENHANCEMENT OF MATHEMATICAL CRITICAL THINKING SKILLS AND SELF-EFFICACY AT SENIOR HIGH SCHOOL STUDENTS THROUGH LEARNING-BASED PROBLEMS CONTEXTUAL MODEL

Abstract

Critical thinking skills of mathematics (KBKM) and self-efficacy (SE) of math students is still relatively low. This is due to the learning of mathematics in the classroom monotonous, so that students feel bored in learning mathematics, students' passive learning, and students are not self-sufficient in constructing knowledge and untrained students develop thinking ability. Learning model that predicted either to be applied to the study of mathematics and in order to encourage the emergence KBKM and SE math student is problem based learning model contextual (PBMK). The purpose of this study is to improve KBKM and SE mathematics students through the application PBMK models. This research uses experimental design pretest-posttest control group design. The study population was all students in grade X SMAN 3 Kendari, samples were taken two classes by using purposive sampling and determination of the experimental class and control class chosen randomly. Students got a model experimental class and control class PBMK receive direct instructional model (PL). The research instruments used were pretest and posttest for KBKM, SE scale and observation sheet. Data were analyzed by descriptive qualitative, t-test, analysis of randomized block design, and multivariate analysis. Based on the results of data analysis can be concluded that overall, KBKM and SE mathematics students who obtain PBMK models increase significantly higher than students who received the OT. Based on prior knowledge of mathematics students, the average increase KBKM and SE math students by category PAM (high, medium or low), which received a model PBMK higher than the average increase in KBKM and SE math students by category PAM (high, medium or low ) who got the OT model. The results of the analysis of observational data indicate that the models PBMK can improve the students' learning activities.

Keywords: Mathematics critical thinking skills, self-efficacy and problem-based learning contextual.

A. Introduction

Kurikulum Tingkat Satuan Pendidikan (KTSP) or Unit Level Curriculum (SBC) states that learning mathematics is expected to acquire the ability to reason, as reflected by the ability to think logically, critically, systematically, and have an objective nature, honesty, and discipline problems. Thus, mathematics is something that needs to be owned, understood, and was developed by students as a means to help them in their daily lives (tools of solving problems) as a form of mathematical literacy. According to the OECD (2013: 25), mathematical literacy is an individual's ability to formulate, implement and interpret mathematics in various contexts, including the ability to perform mathematical reasoning and use of concepts, procedures, and facts to describe, explain or predict phenomena/events. Mathematical literacy helps a person to understand the role or usefulness of mathematics in everyday life as well use it to make decisions right as a citizen to build, caring, and thinking.

The ability to think mathematically in particular high-level mathematical thinking is very
necessary for a student to solve problems encountered in daily life. Therefore, the ability to think mathematically, especially regarding to doing math (math activities) need special attention in the learning process of mathematics. In order to achieve these objectives, the latest issues in mathematics today is developing High-Order Thinking Skills (HOTS), and make HOTS as the main purpose of learning mathematics. The ability to think critically in this case the critical thinking skills of students Indonesia is still low, so that the student is weak in resolving the problems of non-routine associated with constructing and recognize the structure of arguments, the reasons supporting arguments, define, analyze, and think of solutions to problems; simplify, organize, classify, connecting, and analyzing mathematical problems, integrate information and make the connection to draw conclusions. A low critical thinking skill of mathematics was caused by the weak quality of learning mathematics.

Some research suggests that low mathematics students' critical thinking skills are closely related to the quality of teaching of mathematics teachers in the classroom. As stated by Peter (2012) that teachers do not engage students in critical thinking activities to solve complex problems in the real world. Correspondingly, Noer (2009) found in a study of mathematics is still a lot of math teachers who embrace the paradigm transfer of knowledge. In this case the interaction in the learning occurs only in one direction from the teacher as a source of information and students as recipients of information. Students are not given many opportunities to participate actively in the learning process in the classroom, in other words, learning is more centered on the teacher, not the student. Learning math is done nowadays orientation is more the result and not the process.

Based on preliminary studies conducted by researchers at SMA Negeri 3 Kendari in 2013 also showed the critical thinking skills of mathematics students is still low, it is seen from the percentage of each indicator mathematics students' critical thinking skills. In identifying indicators reached 21.74%, 39.67% reaching evaluate, connect only reached 8.65%, troubleshoot reached 17.39% and in analyzing indicators reached 17.12%. In addition, if seen from the attitude of the students in this case self-efficacy is defined as the self-confidence of students, it still looks low. Students feel pessimistic when faced with problems related to mathematics. Students are not confident in solving mathematical problems. Students also feel fear in expressing opinions and asked the teacher if experiencing difficulty learning mathematics. This is in line with the opinion of Bandura (2009: 7) which states that a person with low self-efficacy which easily give up in the face of problems, tend to become stressed, depressed and have a narrow vision of how best to resolve the problem.

An indication of the low critical thinking skills of mathematics and mathematics self-efficacy among students is that students feel bored in learning mathematics, students' passive learning, students are not self-sufficient in constructing knowledge and untrained students develop thinking ability. It shows that not a mathematic which are difficult to study, but due to the applied learning does not match the needs of students and the learning that takes place is not meaningful to students.

The majority of students in the school are not able to make the connection between what they learn and how such knowledge will be used. This is because the way students process information and students' motivation to learn is not touched by the traditional methods of teaching in the classroom. Difficult students understand math concepts taught in an abstract way and lecture so that students need to understand the concepts related to the workplace and the larger society in which they live and work.

Contextual problem based learning model is offered as a holistic learning in education that can be used by all students, both highly talented students and students who have learning difficulties. Efficacy of contextual learning lies in the opportunity given to all students to develop their talents with the expectations and the concept of teaching and learning which enables teachers to associate learning with the real world. Contextual problem-based learning is an educational process that aims to help students see meaning in the academic material they are learning by linking academic subjects in the context of their daily lives, which is the context of the circumstances of personal, social, and cultural development. To achieve this goal the components that must be met are: create linkages-linkages are meaningful, do meaningful work, do a self-regulated learning, cooperation, critical and creative thinking, helps individuals to grow and develop, achieve high standards, and using authentic assessment (Johnson, 2012: 67).

Arends (2008: 43) argues that the problem-based learning can help students develop
thinking skills, problem-solving skills, and skills intellectual in this study the roles of adults with experience through various situations rill or situations are simulated and become students learn independent. The results of problem-based learning are about intellectual achievement that comes from active participation feel meaningful experiences, experiences that strengthen relationships between existing knowledge and new knowledge form relationships. To help students develop their intellectual potential, problem-based learning teaches the steps that can be used in critical thinking and provides the opportunity to use the thinking skills in higher tiers in the real world.

At the most fundamental level in problem-based learning is characterized by students working together in small groups to investigate real-life problems, so that students who feel less confident can ask questions without feeling embarrassed. Students will be easier to explain understanding of the concept to other students or recommend solutions within the group. By listening to other students in the group, students evaluate and formulate their own understanding. They learn to respect the opinions of others because sometimes different opinions proved to be a better approach to this problem. Crawford (2001: 11) argues that when a group working toward a common goal, the students gain experience of working groups have the confidence and motivation higher than students who work alone.

B. Literature Review
   1. Mathematical Critical Thinking
      Krulik & Rudnick (Somakim, 2010: 41) argues that it is included in the mathematics critical thinking is thinking that tested, questioned, connect, evaluate all aspects of the situation or a problem. In line with these opinions, Somakim (2010: 44) argues that critical thinking mathematically differentiating opinions and facts, conclusions and reasoning, inductive and deductive arguments, as well as objective and subjective. Furthermore, the ability to create questions, construct and identify the structure of arguments, the reasons supporting arguments; defining, analyzing and thinking about solutions to problems; simplify, organize, classify, correlate and analyze mathematical problems; integrate information and make the connection to draw conclusions; further examine the feasibility conclusion, applying the knowledge and understanding gained through new mathematical problems.

   2. Self-efficacy
      Of the various experts, self-efficacy in practice synonymous with "Confidence" or "Confidence". According Santrock (2011: 363), self-efficacy is the belief that one can master a situation and provide a favorable outcome. In line with these opinions, Bandura (in Feist & Feist 2008: 488) defines self-efficacy as a human belief or confidence in their ability to exercise some control over the function of the size of themselves and events in their environment. Self-efficacy is also the consideration of someone about her ability to achieve the level of performance (performance) are convinced or determined, which ultimately will affect the next action. Keep in mind that self-efficacy is one component of the self-regulated (self-reliance).

      Bandura (2009) explains that self-efficacy will influence the actions, effort, perseverance, flexibility in difference, and the realization of the objectives of this individual, so that self-efficacy related to one's ability often determines the outcome before the action occurs. According to Bandura, self-efficacy is the construction of a central in social cognitive theory that a person shall: (a) affect its decision-making and influence the course of action, one would tend to run something when he feels kompoten and confident, and would avoid it if it is not; (B) assist how much effort he is acting in an activity, how long he stayed when in trouble and how flexible in an unfavorable situation for him, in this case the greater a person's self-efficacy, the greater the effort of perseverance and flexibility; (C) affect the mindset and emotional reactions. A person with low self-efficacy which easily give up in the face of problems, tend to become stressed, depressed and have a narrow vision of what is best to resolve the problem while high self-efficacy will help a person in creating a sense of calm in the face of difficult problems or activities.

   3. Learning Model with Contextual Teaching and Learning Approach
      Berns and Erickson (2001: 3) argues that one of the learning models that use or
association with CTL is problem-based learning (problem-based learning (PBL)), which is a model of learning that uses real-world problems as a context for students to learn through critical thinking and problem solving skills in order to acquire the knowledge and concepts are the essence of the subject matter.

The cornerstone of the philosophy of problem-based learning (problem based learning) is a cognitive-constructivist perspective proposed by Jean Piaget and Lev Vygotsky that students with any age are actively involved in the process of getting information and construct their own knowledge. This knowledge is not static, but constantly evolving and changing for students construct new experiences that force them to base you and modify previous knowledge (Arends, 2008: 47). Selanjuntnya based learning contemporary problems also rely on other concepts derived from Bruner, the idea of scaffolding, a process for a student who assisted teachers or people are better able to cope with problems or mastering skills slightly above the level of development at this time.

The core of the problem-based learning is the teacher exposes students to the real-life problem situations (authentic) and meaningful, to facilitate students to break through the investigation/inquiry and cooperation, facilitate dialogue on the various aspects, encouraging students to produce work solving and modeling results. Interest that can be developed through this learning model is thinking skills and problem solving, performance in the face of real life situations, establish autonomous and independent learners.

C. Methodology

This research is Experiment with using a pretest-posttest control group design. A sample of 53 students of class X SMA, divided into one experimental class (27) and one control class (26), selected at random. Experimental class taught by contextual problem-based learning model, while the control class was taught by direct learning model. The instrument used in this study is a test instrument that is test critical thinking skills and mathematical instruments in the form of non-test questionnaire scale of self-efficacy and mathematics student observation sheet activities of teachers and students during the learning process. Technical analysis of the data used in this study is inferential analysis techniques. Data were analyzed quantitatively and to answer research hypothesis. Quantitative data obtained from the analysis of the students’ answers on tests of mathematical ability of critical thinking and self-efficacy scale before and after the students got a contextual problem-based learning in both the experimental class and the control class. Quantitative data were tabulated and analyzed using a descriptive analysis of the data and calculate the gain normalized (N-Gain) pretest and posttest. The statistical test used to answer the hypothesis of two different test median, variance analysis with the group randomized design and analysis of variance variable dual bidirectional (two-way MANOVA). Before performing statistical tests, first tested the assumption, which is data normality test using the Kolmogorov-Smirnov test and homogeneity of variance using Levene test.

D. Finding and Discussion

1. Findings

1. Data Analysis of Critical Thinking Ability of Mathematics (KBKM)
   a. Data Analysis of Differences Level of Students’ Math Critical Thinking who got PBMK and PL

   Based on the test results Independent Samples T-Test obtained t value of 4.804 and a probability value (Sig.) Is 0.000, so H0 is rejected. Thus, we can conclude that there are differences in the increase in critical thinking skills mathematical significantly between groups of students who received PBMK models and a group of students who received the OT model. Therefore, by looking at the average value of the N-Gain derived from both groups study shows that the average value of the N-Gain students getting models PBMK amounted to 0,509 and the middle category higher than the average value of N-Gain students who got the OT model which only amounted to 0.275 and that are in the low category. Thus, it can be concluded that the increase in critical thinking skills students gain mathematical models PBMK significantly better than students who received the OT model on the whole student.

   b. Differences Increase of Students’ Mathematics Critical Thinking Based Early Mathematical Sciences (PAM)

   The test results of analysis of variance with a randomized block design showed that the
probability value (Sig.) of treatment 0.000 α = 0.05 so that H0 is rejected. This means that, there is the influence of problem-based learning model contextual and direct learning model to increase critical thinking skills of mathematics in terms of categories of PAM (high, medium, low). Because there are significant PBMK models and models of PL to increase student KBKM terms of categories of PAM, we then test the significance of the difference between the increase in KBKM students who got a model that gets PBMK and PL models for each category of PAM.

Based significance test indicates that the probability value (Sig.) Of all categories of PAM smaller α = 0.05 so that H0 is rejected. This means that the three categories of PAM, students who received PBMK models earned an average increase KBKM which is significantly larger than students who received the OT model.

2. Data Analysis of Students’ Math Self-Efficacy

a. Difference of Increase for Students’ Math Self-Efficacy who got PBMK and PL

Based on the test results Independent Samples T-Test obtained t value of 4.945 and a probability value (Sig.) is 0.000, so H0 is rejected. Thus, we can conclude that there are differences in average mathematics self-efficacy increase significantly between groups of students who received PBMK models and a group of students who received the OT model. Therefore, by looking at the average value of the N-Gain derived from both groups study shows that the average value of the N-Gain students getting models PBKLM amounted to 0.547 and middle category higher than the average value of N-Gain students who got the OT model which only amounted to 0.364 and middle category. Thus, it can be concluded that the increase in self-efficacy mathematics students who PBKLM models significantly better than students who received the OT model on the whole student.

b. Differences Increase of Students’ Self-efficacy Based Early Mathematical Sciences (PAM)

The result of analysis of variance with a randomized design showed that probability value (Sig.) Of smaller treatment α = 0.05 so that H0. This means that, there is the influence PBKLM models and models of PL to the improvement of mathematics self-efficacy in terms of categories of PAM (high, medium, low). Because there are significant PBKLM models and models of PL to increase student mathematics self-efficacy in terms of categories of PAM, we then test the significance of differences increase student mathematics self-efficacy between the received models PBKLM and who got the OT model for each category of PAM.

Based significance test indicates that the probability value (Sig.) Of all categories of PAM smaller α = 0.05 so that H0 is rejected. This means that the three categories of PAM, students who received PBKLM models earned an average improvement of mathematics self-efficacy were significantly larger than students who received the OT model.

3. Data Analysis of Critical Thinking Ability of Mathematics and Mathematics Student Self-Efficacy Based Early Mathematics Knowledge

Based on the results of analysis of variance variable double two-way (Two-way MANOVA) showed that the value of Wilks' Lambda of treatment amounted to 0.280 greater than the value table U2,1,2 = 0.0025, or by looking at the value of F = 61.579 is greater than F2 2 = 19.00, or more simply by looking at the probability value (Sig.) of smaller treatment α = 0.05 so that H0 is rejected. This means that, there is the influence of problem-based learning model contextual and direct learning model to increase students’ critical thinking skills of mathematics and mathematical self-efficacy of students based on prior knowledge of mathematics. The model used in the analysis of multiple variables two-way variance is:

\[ Y_{ijk} = \mu_k + \tau_{ik} + \beta_j + \epsilon_{ijk} \] .................................(1)

Based on the results of parameter estimation can be made of the equation or the estimated increase in critical thinking skills and self-efficacy mathematics mathematics students from equation (1), is as follows

\[ Y_1 = 0.128 + 0.240 \tau_1 + 0.415 \beta_1 + 0.096 \beta_2 \] .................................(2)

From the equation, it can give an estimate of the improvement of mathematics students’ critical thinking skills (Y1). Furthermore, estimates of the increase in self-efficacy mathematics (Y2) are as follows:

\[ Y_2 = 0.270 + 0.187 \tau_1 + 0.220 \beta_1 + 0.079 \beta_2 \] .................................(3)
2. Discussion

The results of this study are consistent with results of previous studies that students who receive contextual learning model significantly gain increased critical thinking skills math higher than students who received conventional learning or learning directly, such as research Noer (2009), Somakim (2011), Syahbana (2012) and Wiliyati (2012). Something similar happens to students who receive contextual learning model significantly gain increased self-efficacy higher math than students who received conventional learning or learning directly, such as in research Somakim (2011) and Wiliyawati (2012).

If seen from the characteristics of problem-based learning model contextual, as previously described this condition might happen. Students who receive contextual problem-based learning cooperative learning through problem solving process contextual day-to-day student or contextual problem being simulated. In the process of solving these problems, students use all its potential to solve the given problem both independently and cooperatively to forward it to the class discussion. When students have problems in the process of solving the problem, they put a question to the teacher or the other students to clarify the issues and the various tasks assigned. At the same time, students are able to share, maintain, or value the opinions or ideas of solving the problem raised by other students. This activity can develop students’ understanding of math problems given so as to facilitate them to solve the problem. This is demonstrated by the increasing critical thinking skills and self-efficacy mathematics mathematics students. This is in accordance with the opinion of Arends (2008: 43) that the problem-based learning can help students develop thinking skills, problem-solving skills as well as skills for independent learning and social skills.

Based on the initial knowledge factor mathematics student, was also a significant effect on the increase in critical thinking skills and self-efficacy mathematics mathematics students. The results of this study showed that the higher the students’ prior knowledge, the higher the increase in critical thinking skills and mathematical self-efficacy is obtained by the students. In line with the results of research Somakim (2011) there are significant differences in terms of improving the critical thinking skills of mathematics based learning approach in terms of initial knowledge of mathematics students, but there are no significant differences in terms of increased self-efficacy based learning approach in terms of knowledge of early mathematics students. These results are in line with the opinion of Arends (2008: 268) that the initial ability of students to learn new ideas depend on prior knowledge of their previous and existing cognitive structures.

In general, it can be concluded that there are differences in problem based learning and contextual learning model directly to an increase in critical thinking skills and self-efficacy mathematics student mathematics overall and by category of initial knowledge of mathematics. This indicates that there are influences learning model to increase critical thinking skills and self-efficacy mathematics students. Based on the results of research and discussion, problem-based learning model contextual better able to improve the critical thinking skills of mathematics and mathematics self-efficacy of students.

E. Conclusion

1. Improved critical thinking skills of students who got a mathematical problem based learning model contextual significantly better than students who received direct instructional model.
2. The average increase students’ critical thinking skills of mathematics with PAM category (high, medium or low) that received contextual problem-based learning model is higher than the average increase in critical thinking skills of mathematics students with PAM category (high, medium or low) that gets direct instructional model.
3. Increased self-efficacy mathematics students who received problem-based learning model contextual significantly better than students who received direct instructional model.
4. The average increase in self-efficacy mathematics students with PAM category (high, medium or low) that received contextual problem-based learning model is higher than the average increase in self-efficacy mathematics students with PAM category (high,
medium or low) that gets direct instructional model.
5. There is the influence of contextual problem-based learning model and learning model
directly to the improvement of students' critical thinking skills of mathematics and
mathematical self-efficacy of students based on prior knowledge of mathematics.
Problem based learning model contextual significant effect on the increase in critical
thinking skills and mathematical mathematics self-efficacy of students based on prior
knowledge of mathematics category.

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THE EFFECT OF VAN HIELE LEARNING MODEL TOWARD GEOMETRIC REASONING ABILITY BASED ON SELF-EFFICACY OF SENIOR HIGH SCHOOL STUDENTS

A. Introduction

Mathematics is a science that is very useful in solving the problems of life and in an effort to understand the other sciences. In each level of education, learning mathematics for students is not easy, because math is abstract. Especially for students who are still in junior high school, especially the eighth grade students who ditutut to think abstractly and understand verbal symbols, are still experiencing difficulties.

Advances in science and technology are one of which is based on mathematics. Mathematics is the science that addresses both the pattern regularity patterns in nature and in the human mind. The development of mathematics impact on expanding the horizon of thinking that requires readiness of educators and students face the challenges of globalization. Opportunities and challenges are always hand in hand. Educators can not be separated from the demand to constantly improve the quality of education is not only chasing the target imposed curriculum and the students are required to be creative and develop its potential.

Khoiriyyah, et al (2013: 19) states that the reality on the ground shows that the majority of students still did not master the material geometry, one high school levels. In fact, one of the branches of mathematics is geometry basically has a greater opportunity to understand the students compared with other branches of mathematics. This is because the ideas of geometry already known by the students early before they enter school, for example, line, area and space (Abdusakkir, 2010).
Saragih (2011: 5) revealed that low ability students in geometry, particularly with respect to spatial inseparable from the learning process. Facts on the ground generally indicate that math teachers place more emphasis on aspects of memory geometry. Although the teacher has used props to cultivate students’ reasoning about concepts of geometry, but teachers often rush directing students understand geometry through the two-dimensional image.

Reality on the ground, based on a preliminary study conducted in SMA Negeri 1 Wundulako regard geometric reasoning ability of students is low. Among the evidence that there is the matter of which have been tested to measure students' geometric reasoning ability, the dominant air-problems at level 2 and level 3. Most of the students of class X 30 samples are not ready at level 2 or 3 or level of abstraction and formal deduction, because only 27% and 7% of students who reach that level. Problems indicated in reasoning abilities geometric students namely at the level of abstraction related to the ability of intuition spatial students classified as weak when students had to imagine something abstract, predominantly students find it difficult to solve problems at the level of the late counting by associating concepts previously learned, the basic concept which is a prerequisite of three dimensional material is low both the understanding of basic geometry in junior high school, the concept of Pythagoras and algorithm processing errors. Meanwhile, students of class XI student of 30 samples of 16.5%, 8.8%, 3% and 3.8%, is at level 0, 1, 2, and 3. It is influenced because the student's ability to reason the problem is logic is still low, basic knowledge of mathematics is low, there is no readiness of students in work on the problems that are different from the sample questions created teacher or understanding of mathematical concepts is not optimal.

Students have the confidence (self-efficacy) lower by preliminary observations that students’ attitudes toward learning mathematics, among them was pessimistic when faced with a mathematical problem, quickly surrendered and was not going to work before trying. Students are not confident in solving mathematical problems, not like the challenges, doubts about his ability. Most students also feel fear in expressing their opinions and ask the teacher if you have trouble learning math, not actively involved in the learning, when the teacher asked some students to work on the problems on the board they are dominant not confident just those commonly designated ride answered, Other negative attitudes in learning mathematics impact on the student's knowledge does not develop optimally.

Budiarto (2000: 439) states that the purpose of learning geometry is developing the ability to think logically, developing spatial intuition, imparting knowledge to support other materials, and can read and interpret mathematical arguments. Learning geometry related to the reason. In line with Budiarto, Bobango (1993: 148) said that the purpose of learning geometry is that the students gain confidence about her math skills, be good problem solvers, to communicate mathematically, and to reason mathematically.

The confidence of the students affects the level of knowledge that will be achieved. In the sense that when students try, practice and diligent in learning it will be a positive influence on mathematics learning outcomes. With the confidence of the students are expected to become more personally prepared with the challenges in dealing with problems in everyday life, especially to solve mathematical problems. Confidence would be better if more forward directed learning activity discipline, responsibility, curiosity, initiative, innovation, and perseverance so that students can improve their geometric reasoning abilities.

Abdussakir (2002: 344) states that among the various branches of mathematics, geometry occupies the position of most concern. The difficulties of the students to learn geometry occurs from elementary to college level. This leads to learning difficulties less than perfect understanding of the concepts of geometry, which in turn inhibits further learning geometry.

High school students of class X in backing learned geometry on the three-dimensional material more emphasis on facts that partially studied and the basis of calculation is the working procedure of the “principle, to work on the problems thus necessary procedures such work”. Analysis especially of spatial analysis of lacking in portions, so that spatial ability becomes weaker disclosed Krismanto (2004: 1).

Hidayat (2013: 40), based on observations he did, resulted that the space dimension three is one lesson material math class X SMA / MA is a material that is very difficult, to understand Because it is abstract and there are some problems as other causes items, namely : (a) the student’s skills in drawing and use tools to draw shapes dimensional space of three still low, (b) the ability of understanding of mathematics concepts students are still less than satisfactory, (c) some students Rely on rote without understanding the concept that made a mistake do the problems, (d) the material Prerequisites include straight lines, angles, broad flat wake,
trigonometry and the terms of entry into force of the Pythagorean theorem not yet mastered by most students.

Low geometry problems has inspired a variety of research based on a learning model van Hiele them conducted by Atebe and Schafer (2008), Mateya (2008). In addition, the van Hiele theory offers mostly hopes to meet the challenges of different levels of students’ reasoning in geometry. The largest contribution to the van Hiele theory is that differences in the level of reasoning is under the control of teachers and can be facilitated with the right instruction disclosed Pusey (2003: 50).

Kepner (2006: 7) states that these levels van Hiele geometric reasoning is the visualization, analysis, deduction informal, formal deduction and accuracy. These five levels or stages on geometric reasoning above are also the thinking stages that must be passed students in understanding the geometry. Although the geometric reasoning simply specialize in learning geometry, but a lot of benefits that can be derived from levels or stages of geometric reasoning. Teachers can take advantage of the stages of cognitive development of children raised van Hiele. Teachers can find out why a student does not understand that the cube was the beam for these students thinking stage is still in the analysis phase down yet entered the stage of sorting.

Students in solving mathematical problems, there are several important cognitive components that should have and is highly dependent on the ability of reasoning. The first component is the understanding of the problem. Students understand the facts, concepts or principles. If the context is to develop new knowledge through problem solving then he must seek understanding concepts or principles contained in the matter. The second component ie after the new understanding gained new concepts linked to or associate with the knowledge and experience that has been previously owned. The third component is a metacognitive the students’ ability to monitor, control and evaluates the work in solving the problem (Natiputulu, 2008: 168-169).

Educators as a reformer should continue to improve its ability to face the challenges of the future. Therefore, one capability that is expected to be explored and enhanced through learning mathematics is the geometric reasoning ability by applying the learning model van Hiele because generally the models of learning based on the principles and theories of supporters. According Sagala (2010: 64) regarding the learning model includes an extensive and thorough approach is not just a combination of the facts that are arranged at random but a systematic procedure to modify the behavior of learners based on certain assumptions.

Students will go through the level of thinking in studying and understanding the geometry different from each other inside the van Hiele theory, educators need to consider the level of development of student thinking in geometry. In this case the use of this model adapts to the intellectual development of students, it will be able to enhance the students’ understanding of the material being taught teachers. The learning model van Hiele expected to be applied in the study of mathematics in order to develop geometric reasoning ability and self-efficacy of students. Because mathematics is also associated with one’s confidence in solving math problems with certain levels of thinking that can be achieved by students.

Consider the condition of mathematics in high school at the moment and of the various concepts of thinking described above is deemed necessary for the improvement of learning by applying the learning model van Hiele and the lack of sufficient reasoning ability geometric and confidence (self-efficacy), especially students in SMA Negeri 1 Wundulako.

B. Literature Review
1. Geometric Reasoning Ability

Wing (1985: 6) states that “geometric reasoning is the process of defining and deducing the properties of a geometric entity using the intrinsic properties of that entity, its relationship with other geometric entities, and the rules of inference that bind such properties together in geometric (Euclidean) space ”, which means that the reasoning geometric is the process of defining and deduce the properties of a whole geometry using the intrinsic properties of the force, to do with the unity of the geometry of the others, and rules to draw conclusions that really intertwined among the properties that exist in space geometry (Euclid). In other words, geometric reasoning includes complex aspects, namely: (1) define and deduce properties of geometry, (2) relate it to other aspects of the geometry, and (3) draw conclusions based on the rules (postulate) that already exist.

Van Hiele also split geometric reasoning ability into five levels. The level or levels of thinking through which students in understanding the geometry of the visualization, analysis, deduction informal, formal deduction, and accuracy, Kepner (2006: 7-8). In discussing the high
school level to level 3 (formal deduction), where that third level of geometric reasoning on the high school level is reached then one way is to implement the fifth phase of the above (Khotimah, 2013: 10).

2. Van Hiele’s Learning Model

Van Hiele learning model is a model of learning which involves five phases (steps) is: information, directed orientation, explication, free orientation, and integration. Clement (2004: 34) states that the theory would be useful if used, tested and modified. According to these criteria, the van Hiele theory is a theory that is useful. According Halat (2006: 8), some of the results of empirical studies mention that the van Hiele theory is useful in the development of the concept of geometry students, ranging from primary school to university.

Van de Walle (2006: 151) states that all levels to explain about how we think and type of geometry ideas of what we think, rather than how much knowledge we have. In addition, a significant difference from one level to the next level is the mental objects that that which we think geometrically.

3. Self-efficacy

Self-efficacy is one of the main concepts Bandura in his research. According to the theory and research Bandura (1995) self-efficacy to make a difference in the way people feel, think, act, and motivate yourself in terms of feelings (Zulkosky, 2009: 94). Of the various experts, self-efficacy in practice synonymous with "confidence" or "confidence", although "self-confidence" is a term which is non-descriptive, referring to the power of conviction, such a person can be very confident, but ultimately failed, Self-efficacy is defined as a person's judgment about his ability to reach a level of performance (performance) is desired or determined, which will affect the next action. Self-efficacy is one component of the self-regulated (independence) (Risnansanti, 2009: 199).

C. Methodology

The research subject is class and SMA Negeri 1 Wundulako in the academic year 2013/2014 in Kolaka City East Sulawesi who can be divided into categories of students’ self-efficacy (high, medium, and low). The division is carried out at the beginning to get a picture of geometric reasoning skills and confidence (self-efficacy) of students who passed the student in learning geometry. Selection was based on their school problems related to geometric reasoning skills and confidence (self-efficacy) students.

This study is a Quasi-Experimental research is the development of True Experimental, with Nonequivalent Control Group Design.

Elements of this study are determined by the category of self-efficacy mathematical students (high, medium and low), the category of van Hiele model of learning and conventional learning. To further clarify the reasoning geometric design of experiments (Y) by a factor learning model (A) and the factor of self-efficacy (B), as shown in the following table:

<table>
<thead>
<tr>
<th>Table 1. Factorial 3x2 Design Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Model (A)</td>
</tr>
<tr>
<td>van Hiele (A=1)</td>
</tr>
<tr>
<td>Conventional (A=2)</td>
</tr>
<tr>
<td>A1-A2</td>
</tr>
</tbody>
</table>

D. Finding and Discussion

1. Findings

General overview of the geometric reasoning abilities of students after getting the van Hiele model of learning and conventional learning model based on the score (pretest) and (posttest), then calculated the gain is normalized (N-Gain) geometric reasoning abilities both in the experimental class and control class. Average of (mean) normalized gain derived from this calculation is the portrait of an increase in geometric reasoning abilities of students whose learning using van Hiele model of learning and learning using conventional learning models. Description of the calculation result can be seen in Table 2 below:
Comparison of the average N-Gain and geometric reasoning abilities of standard deviation between the experimental group and the control group presented in bar charts in the following picture:

![Bar Chart Comparison of N-Gain Geometric Reasoning Ability](image)

From Table 2 and Figure 1 shows that the average value of the N-Gain geometric reasoning ability or the experimental group of students whose learning meng-use learning model van Hiele (= 0.54) higher when compared to the control group or students who are learning to use the model conventional learning (= 0.356). This indicates that the increase in geometric reasoning abilities in the experimental class is better when compared with the increasing capability of geometric reasoning in the control group. In general, the quality improvement of geometric reasoning ability in the experimental class by using model van Hiele and grade control using conventional learning models included in the medium category can be seen from the average N-Gain of 0.5 which lies in the interval 0.3 and 0.7.

**Testing Requirements for Analysis Statistics**

Based on the test results data normality using the Kolmogorov-Smirnov test in SPSS 20 concluded that the data geometric reasoning abilities both groups normally distributed learning. It can be seen from all Asymp. Sig. (2-tailed) value is greater than the significance level of 0.05. Therefore, by using statistical parametric testing can proceed.

**b) Uji Hipotesis**

1. **Reasoning Ability Test Data Discrepancies Both geometric Students Based Learning Group**
   
   Testing data discrepancies geometric reasoning skills students are learning by both groups using t-test.
   
   The formulation of hypotheses to be tested is.
   
   H0: $\mu_1 = \mu_2$
   
   H1: $\mu_1 > \mu_2$

   with $\mu_1, \mu_2$ row is an average geometric reasoning ability of students taught by van Hiele model of learning and taught by conventional learning models. From the test results signikansi difference geometric reasoning based geometric reasoning is based on two groups learning probability value ($\text{sig} / 2$) is smaller than 0.025, which will be rejected. Thus, there is a significant difference on average geometric reasoning ability between the two groups of students learning.

2. **Reasoning Ability Test Data Discrepancies geometric Students by Categories Self-efficacy High on Both Study Groups**

   The formulation of statistical hypotheses tested were: $M11 = \mu_{12}$; $M11 > \mu_{12}$

   with $M11, \mu_{12}$, a row is an average geometric reasoning abilities of students with high self-efficacy categories in both study groups. From the test results signikansi difference geometric reasoning based geometric reasoning is based on self-efficacy is high both groups learning probability value ($\text{sig} / 2$) is smaller than 0.025, which will be rejected. Thus, there is a significant difference on average geometric reasoning abilities of students based on high self-efficacy between the two study groups.

   Reasoning Ability Test Data Discrepancies geometric Students by Categories Self-efficacy in the Second Medium Group Learning
3. The formulation of statistical hypotheses tested were:
   \[ M_{21} = \mu_{22}; : M_{21} > \mu_{22} \]
   with \( \mu_{21} \), \( \mu_{22} \), a row is an average geometric reasoning abilities of students with the category of self-efficacy were the two learning groups t-test results showed that the probability (sig / 2.) is smaller than 0.025, so it was rejected. Thus, there is a significant difference on average geometric reasoning abilities of students in the category of self-efficacy were the two groups learning:

4. Reasoning Ability Test Data Discrepancies geometric Students by Categories Self-efficacy
   Low on the Second Group of Learning
   The formulation of statistical hypotheses tested were:
   \[ M_{31} = \mu_{32}; : M_{31} > \mu_{32} \]
   with \( \mu_{31} \), \( \mu_{32} \), respectively the geometric reasoning abilities of students with the category of self-efficacy was lower in both groups of study. T-test results showed that the probability (sig / 2.) Is greater than 0.025, so Ho accepted. Thus, there was no significant difference in the average geometric reasoning abilities of students in the low category of self-efficacy both study groups.

c) Data Analysis of Mathematic Self-Efficacy

1. Description of Mathematic Self-Efficacy
   Self-efficacy data obtained through self-efficacy questionnaire. Self-efficacy questionnaire was given to the experimental group or the control group, before applying the learning model and conventional van Hiele which aims to get an overview of the level of confidence (self-efficacy) students. More details can be seen in Table 3 below:

<table>
<thead>
<tr>
<th>Category for Students' Self-efficacy Level</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
</tr>
<tr>
<td>High</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>8</td>
</tr>
<tr>
<td>Low</td>
<td>19</td>
</tr>
</tbody>
</table>

Based on Table 3 shows that the number of students who have self-efficacy with high category in a class experimental and control classes amounted to 4 people, self-efficacy with category of 16 people in the experimental class and 8 in the control class, and self-efficacy by category low of 10 people in the experimental class and 19 in the control group.

2. Student Work on Geometric Reasoning Ability Test
   The results of analysis of the student’s work in completing the test the ability of geometric reasoning in terms of the use of the learning model is presented in Table 4 below:

<table>
<thead>
<tr>
<th>Level of Geometric Reasoning</th>
<th>Learning Model</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>van Hiele</td>
<td>Conventional</td>
</tr>
<tr>
<td></td>
<td>( \bar{X}_{pre} )</td>
<td>( \bar{X}_{pos} )</td>
</tr>
<tr>
<td>Visualisation</td>
<td>0,933</td>
<td>1,000</td>
</tr>
<tr>
<td>Analysis</td>
<td>1,333</td>
<td>1,967</td>
</tr>
<tr>
<td>Abstraction</td>
<td>2,600</td>
<td>3,242</td>
</tr>
<tr>
<td>Deduction</td>
<td>2,467</td>
<td>5,225</td>
</tr>
</tbody>
</table>

Explanation: Level of ideal score 0 (visualisasi) = 1, level 1 (analysis) = 2, level 3 (abstraction) =4, and level 4 (deduction) = 8.

Table 4 shows that after students are taught by van Hiele model of learning and conventional learning models, geometric reasoning abilities of students has increased at every level of geometric reasoning. Students who receive learning model van Hiele obtain greater improvement at every level of geometric reasoning than students who received conventional learning models. International based on the increase in every level of reasoning geometrically at students who are taught by learning model van Hiele, level 1 (analysis) to solve the problem by not see the inter-relationship exists is level with the highest increase in
the amount of 0.951 (high category) and level 2 (abstraction) resolve the problem by looking at the interrelationships that exist in the wake of three-dimensional space is level with the lowest increase in the amount of 0.459 (medium category). While improving every level of geometric reasoning in students taught with conventional learning models, level 1 (analysis) is an indicator with the highest increase in the amount of 0.5633 (medium category) and level 2 (deduction) level with the lowest increase in the amount of 0.3072 (low category).

Based on students' work to resolve any matter reasoning abilities geometric given after being taught by learning model van Hiele, it appears that students are able to solve the problem until the highest level is to solve the problem of reasoning geometric awarded at level 2 (analysis), level 3 (abstraction) and level 4 (deduction). However, in solving one problem still exists students in the process of calculation led to the final result to be one and not a few students who misinterpret the settlement of a matter filed in the matter of representing geometric reasoning ability van Hiele level.

3. Discussion

Factors that teachers use learning models affect the activity of students in the classroom during the learning activities. In the conventional study, teacher predominates learning activities that act as an information center, a source of knowledge, and not involve the student activity in learning. As a result, students are less interested and motivated to follow the lesson, students are difficult to understand the material in depth, learning is not meaningful and understood by the students. Students feel learning these days has nothing to do with future learning. Generally less conventional learning as a great opportunity to explore the knowledge that students are less develop the potential of students' thinking. Consequently troubled students in achieving the level or levels 2 or 3 van Hiele of questions that trained on the subject of three dimensions. Moreover, to be able to solve problems more challenging and difficult requiring high-level thought processes such as geometric reasoning is directed more at the non-routine or other mathematical thinking skills.

Geometric reasoning needs to be trained intensively, so it needs a learning model that allows students perform a geometric reasoning. The learning model van Hiele performed includes five stages that go hand in hand with the level or levels of geometric reasoning abilities of students passed. Alloy certain phases in the learning model van Hiele need to be intensified in learning to better support reasoning ability geometric students namely at the level or levels of certain dominant still problematic for students, learning pursued a more targeted at involving students explore knowledge, activity, and learning systematically.

Van Hiele learning model focuses on the ability of students' knowledge to be passed in the learning of mathematics, especially geometry lesson. Melatihkan learning process with questions that represent levels van Hiele will give an overview for teachers about the ability of students and teachers can provide learning by taking into account the level of development of students' knowledge and does not impose the knowledge of students still at the level below. Because although forced students can only receive knowledge through memorizing not understanding. Learning design in terms of teaching materials, students' worksheets are created to facilitate students' success in learning geometry. Applying the learning steps to follow the van Hiele's Learning Model. In order for the four levels van Hiele at the high school level visualization, analysis, abstraction, and deductions can be achieved in learning geometry. It is appropriate Khotimah opinion (2013: 10) that in order for the fourth level of geometric reasoning on the high school level is reached then one way is to implement the fifth phase; information, orientation directly, explanations, free orientation, and integration. In addition, Van de Walle (2006: 151) states that all levels to explain about how we think and type of geometry ideas of what we think, rather than how much knowledge we have. A significant difference from one level to the next level is the mental objects that that which we think geometrically.

Activities of students in the learning model van Hiele takes place in an optimal start of the activity in the group to resolve the issue with the levels van Hiele who has served on the worksheet, and activities in the classroom to interact with other groups through class discussion. In general, in this learning students are directed to be trained in solving geometry problems with tiers or levels van Hiele and describe the student's knowledge to be passed in learning geometry. Through a series of problems that are described in the teaching materials lead students to develop geometric reasoning abilities. Teachers guide students to use language that is precise and accurate to explain what is observed students to form their own knowledge through a series of problem-solving that is defined at LKS or exercises continue. LKS also is to
train students to develop geometric reasoning ability that is when students try to solve the problems, they can complete in a study group with reference to the teaching materials or the direction of the teacher. Teacher directs students to find their own way to understand the concept through tasks assigned and students express these concepts verbally or in writing. In addition, the mathematics that has hierarchies concept, are related and connected with a series of previous learning. Hinting that matters geometric reasoning skills necessary for the achievement of the expected drilled. Therefore, by applying the learning model van Hiele implement and integrate phase indicators in the learning model van Hiele namely visualization, analysis, deduction informal, formal deduction. The next one is designed, modified in terms of teaching materials and learning tools leads to achievement levels van Hiele which increased from the previous level that has not been achieved or can maintain the levels reached.

The learning activities are designed in accordance with the level or levels and stages of learning model van Hiele leads to the principle of allowing the emergence indicators geometric reasoning abilities. This can be seen when students are working on worksheets, the students will conduct visualizing, analyzing, abstracting, and formal deduction on the scope of learning three dimensional geometry.

The learning model van Hiele with advantages compared to conventional learning model for students who have low self-efficacy did not have a significant influence resulting in learning are not given treatment at any time which leads to increased self-confidence (self-efficacy). Categorize self-efficacy only in the beginning to get an idea of the level of confidence (self-efficacy) of the students and based on the theory that students who have low self-esteem have less geometric reasoning abilities. So the impact on the ability of geometric reasoning on a particular indicator is not achieved or is not maximized.

The reality encountered that van Hiele learning model and conventional, not to significantly influence or significant in the group with low self-efficacy. Therefore, students who have self-efficacy (confidence) lower not actively involved in the learning, embarrassed to ask the teacher if you have trouble, and the basic concept is weak as a three dimensional learning requirements. Although the learning model layer van Hiele seek to reach students with different levels of self-efficacy characteristics in order to obtain an overview of students' knowledge levels. However, van Hiele model of learning is taught to groups of students who have low self-efficacy requires the basic concepts and learning experiences are more associated with the material preconditions that must first be mastered by students. So that work on the problems that measure geometric reasoning ability and level of accuracy less impact on results yet achieved the maximum. This fact is an issue for the group of students who have low self-efficacy. They have difficulty or problem in the operation of the algorithm of questions that measure the geometric reasoning ability at level 2 or 3 on a certain subject in the three dimensions of learning that are not achieved. For those students who are taught by conventional learning models that have a low confidence results of their study were more likely to remain (monotone), knowledge is not growing, tiers or levels van Hiele still problematic both at level 0, 1, 2, or 3 in some subjects three-dimensional. In addition, conventional learning more centered on the teacher, not giving students the opportunity to engage in learning, did not materialize multidirectional communication such as group activities to solve geometry problems.

**E. Conclusion**

Based on the results of this study concluded that: 1) learning model van Hiele had a greater impact than conventional learning models to geometric reasoning abilities of students; 2) learning model van Hiele had a greater impact than conventional learning models to geometric reasoning skills in students who have high self-efficacy; 3) The learning model van Hiele had a greater impact than conventional learning models to geometric reasoning skills in students who have self-efficacy were; 4) There is no influence of van Hiele model of learning and conventional learning models to geometric reasoning skills in students who have low self-efficacy.
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