The Influence of Group Investigation Learning Implementation Judging From Learning Motivation Against Students' Mathematical Problem Solving Ability

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Abstract: This study aims to determine the effect of the application of the group investigation type cooperative learning model on the mathematics problem solving ability of the seventh grade students of SMP N 7 Pesawaran This type of research is a quasi experiment. The population of this study were all students of class VII of SMP N 7 Pesawaran. The technique used for sampling is random sampling. The sample in this study were students of class VII D as an experimental class and students of class VII E as a control class. The instrument used to collect document is a test of students mathematical problem solving skills. Before being used for data retrieval, the mathematics problem solving ability test instrument was first tested. Assesment of the validity of the contents of the test instrument by 2 validators. Bassed on the results of the study, several conclusions were obtained. First, there is influence between models group investigation learning with conventional learning models to mathematical problem solving ability. Second, there is an influence between learning motivation on mathematical problem solving skills. Third, there is no interaction between learning models and learning motivation on mathematical problem solving abilities.

1. Introduction

The strong current of globalization raises competition in various fields of life including the field of education, especially science education. The vision, mission, functions and objectives of national education to realize quality education, relevant to the needs of the community, and competitive in global life[1]. Quality education is closely related to the learning process that takes place in school[2]. Law No. 20 of 2003 article 3 states that national education aims to develop the potential of participants to become human beings who have faith in fearing God Almighty, noble, healthy, knowledgeable, capable, independent, independent and become democratic and responsible citizens[3]. The goal achieved in mathematics was according to the 2000 National Council of Teacher of Mathematics (NCTM) , one of which was learning to solve problems (mathematical problem solving).

There are difficulties of students in solving problems and different levels of thinking, then expertise and the skills possessed by a teacher are expected to be able to choose a learning model in accordance with the targets to be achieved[4]. Other than that the difficulty in breaking right
mathematical problems can not be separated from the learning model that does not correspond to mathematical learning[5]. Problem solving ability is very important for students because it will have a good impact on the life they complete. Problems related to mathematics in everyday life can also act quickly and accurately in making decisions. Hudojo argues that since a long time problem solving has become the focus of attention in learning mathematics[6].

To design teaching and learning activities that can stimulate students to actively participate in the learning process, an appropriate strategy is needed in its delivery, starting from the use of methods, approaches or even types that can generate learning motivation[7]. There are many alternative strategies to improve students ability to speak. One strategy that a teacher can use is to group investigation[8]. According to Udin SW, quoted by Arina, the group investigation method has three main concepts, namely: research or inquiry, knowledge or knowledge, and group dynamics or the dynamics of the learning group[9].

According to Hamdani, the cooperative learning models is a teaching and learning strategy that emphasizes the attitude or behavior that is shared in working together regularly in groups, which consists of two or more people[10]. Investigation is a learning activity that gives students the possibility to develop students problem solving abilities through various activities and obtain the correct results according to the development of the students[11]. The group investigation models is cooperative learning involving small groups where students work using cooperative inquiry, planning, projects, and group discussions, and then present their findings in front of the class. This method is the most complex and most difficult to implement compared to other cooperative methods[12].

This group investigation method is one of the specialization methods of assignments that provide opportunities for students to develop creativity and thinking productivity. According to Wena, quoted by Erik Susanto stated that the Group Investigation (GI) learning process consisted of 6 stages: 1) topic identification, 2) learning assignment planning, 3) research activities implementation, 4) final report preparation, 5) research presentation, 6) evaluation[13]. Group Investigation (GI) is one of the cooperative learning models.

Johnson (1990) state that cooperative learning techniques are based on group investigation. This method focuses on problem solving[14]. Group investigation of models requires students have a good ability to communicate and segment skill process[15]. The ability to solve problems is really needed in mathematics learning activities, in addition to skill in working on them[16]. Problem Solving suggests that inside Troubleshooting is a process involving something speckle solution method known beforehand, to find out the solution of learners should map out their knowledge, and through this process they often develop new knowledge about mathematics[17]. The failure of the purpose of a mathematical learning process is not only caused by difficult mathematics, but is caused by several factors which include the students themselves, teachers, learning methods/media, and learning environments that are interrelated with each other. In this case the researcher focuses on the learning method.

Based on the results of observations at SMP N 7 Pesawaran, the problem in school is that the learning process still uses conventional models using lectures, so that when educators are active in the learning process. Students who do not understand the concept of material can only do the same problem with the example given. For example, in the type of story questions, students often experience difficulties in presenting them into mathematical models. When learning in class, students have difficulty describing material in sequence which results in students solving problems using inappropriate sizes. Based on the description, it can be seen that the problem solving ability. Mathematics students can be said to below.
Based on what happened in the field that has been explained previously, the teacher is required to be able to make improvements. One that can be done by the teacher is to implement a good teaching strategy so that it can support the success of the learning process.

One of the lessons that requires the activeness and cohesiveness of students is the group investigation type cooperative learning. This group investigation method is one of the specialist methods of assignment that provides opportunities for students to develop creativity and thinking productivity. Learners are involved since planning, both in determining topics and ways to learn them through investigative activities.

In general the actual investigation method can be viewed as a method of learning "problem solving" or learning methods "discovery". The investigation learning method of the group must be prepared to prepare problems. Students are then directed to find a concept or principle, because learners together find the concept or principle, it is hoped that the concept is embedded well in the self which in the end learners have good concepts or principles, and are able to represent their ideas well and with master the concept and be able to present it.

2. Method

This study was designed using a quasi experiment design method with the research design used was posttest-only control design. In this study the treatment given to the experimental class was the application of a group investigation type cooperative models to mathematical problem solving abilities, while the control class used conventional learning.

The population in this study were students of class VII SMP N 7 Pesawaran. Furthermore, sampling was carried out with the population conditions having the same average, then randomly selected class VII D as the experimental class and class VII E as the control class. The instruments developed in this study are: (1) test of problem solving ability (2) learning motivation question. So that the quality of the test is good and can measure the desired abilities. The things that are done are making question boxes and statement questionnaires, validity questions and questionnaires to several experts, testing test and questionnaire questions. After the test was tested that was in class IX B, item analysis was carried out, namely: (1) validity, (2) different power, (3) difficulty index, and (4) test reliability. Analysis of item validity using product moment correlation formula, and reliability using alpha formula, while the formula of power is different and the difficulty index used is for essays.

Based on the analysis conducted on the test questions the problem solving ability test that 5 items were declared valid from 8 items, significant and the difficulty index was in the medium and difficult category. Thus the question can be used. Furthermore, the results of the calculation of test reliability obtained $r_{11} = 0.745$ which is in the high category. Whereas for questionnaires from 25 statements declared valid. Furthermore, the questionnaire reliability calculation obtained $r_{11} = 0.886$, which is in the high category. After the questions and questionnaires were analyzed, questions and questionnaires were given to the experimental and control classes to determine students' problem solving abilities and learning motivation. to find out the motivation of learning classified as high, medium, and low with criteria that can be seen in Table 1.

| Criteria | Motivation to learn |
|----------|---------------------|
| $x \geq (+SD)$ | High |
| $(-SD) < x < (+SD)$ | Medium |
| $x \leq (-SD)$ | Low |

Table 1. Criteria for grouping learning motivation
From the results of calculations that have been carried out, the motivation in the experimental class high motivation is 7, medium motivation is 17, low motivation is 6 students. Where as in the control class, there are 5 high motivations, medium 18 students, and low is 7 students.

The data obtained during the study were analyzed with the aim to find out whether the average score of the experimental class problem solving ability was better than the control class. Before performing the statistical test that will be used, a prerequisite test is first, namely the data normality test and data homogeneity test. If the data is normal and homogenitas, the statistical test used is a variance analysis of two different cell paths.

3. Research Results and Discussion
3.1 Anava Calculation Results (Variant Analysis) Two Roads

| Source         | JK    | db  | KT     | Count | Ftable |
|----------------|-------|-----|--------|-------|--------|
| Line (A)       | 6479,540 | 1,000 | 6479,540 | 3,963 | 3,170  |
| Column (B)     | 5377,067 | 2,000 | 2688,533 | 9.552 | 4,020  |
| Interaction (AB)| 208,714 | 2,000 | 104,357 | 0.154 | 3,170  |
| Error          | 36631,613 | 54,000 | 678,363 |       |        |
| Total          | 48696,933 | 59,000 |        |       |        |

Based on Table 1 it can be concluded that H0A is rejected meaning there is influence between students who receive group investigative cooperative learning models with students who receive conventional learning models on mathematical problem solving abilities, it can be concluded that H0B is rejected meaning there is influence between students with high learning motivation, medium, and low in mathematical problem solving skills. Then from the two-way ANAVA calculation, it can be concluded that H0AB is accepted, meaning that there is no interaction between the learning model and learning motivation on students mathematical problem solving abilities.

3.2 Advanced Test Results after Anava

| Learning model     | Motivation to learn | Marginal Mean |
|--------------------|---------------------|---------------|
|                    | High    | Moderate | Low   |         |
| Group Investigation| 87.33   | 78.41    | 69    | 78.25  |
| Konvensional       | 86      | 78.35    | 68.71 | 77.69  |
| Marginal Mean      | 86.67   | 78.38    | 68.86 |        |

To determine a better learning model, there is no need to test guarantee double between lines. Table 2 shows that the average arginal space between rows for group investment learning models is greater than the marginal average for conventional learning.

Cooperative learning model group investigation is a learning model that consists of 5-6 students who will work together to achieve a common goal. Investigation begins when the teacher gives a problem. When doing research they give answers to problems, students look for the knowledge they get to get information, ideas, interests and experiences that each of them bring when doing assignments. Interaction between learners will cause mutual encouragement, mutual develop
ideas, help each other to focus their attention on the task, and each other opposes the idea of purpose so that students better understand the material they are learning.

Based on that, the mathematical problem-solving ability produced by students is better if taught using group investigation cooperative learning models rather than using conventional learning models. In accordance with the results of this study, students who obtain group investigation cooperative learning models are better than students who obtain conventional learning models on mathematical problem solving skills.

**Table 4. Calculation Method of Scheffe**

| No. | Interaction   | F_count | F_table | Conclusion   |
|-----|---------------|---------|---------|--------------|
| 1   | µ₁ vs µ₂      | 3.617   | 4.02    | H₀ is accepted |
| 2   | µ₁ vs µ₃      | 11,671  | 4.02    | H₀ is rejected |
| 3   | µ₂ vs µ₃      | 5,071   | 4.02    | H₀ is rejected |

Based on the calculation results of several test comparison between columns in Table 3, it can be concluded that: 1) H₀ is received, meaning that there is no significant difference between students mathematical problem solving abilities who have high and medium learning motivation towards students who obtain investigation learning models conventional learning group and models. 2) H₀ is rejected, meaning that there is a significant difference between students mathematical problem solving abilities who have high and low learning motivation on students who obtain group investigation learning models and conventional learning models. 3) H₀ is rejected, meaning that there is a significant difference between students mathematical problem solving abilities who have moderate and low learning motivation for students who obtain group investigation learning models and conventional learning models.

The results of the same study were carried out by Erik Susanto that the mathematics learning outcomes of students who were given a group investigation cooperative learning model was better than conventional learning models. Learning motivation for students and students is said to be good if students like problems or challenges and involve them selves directly in finding solving problems. In addition, students feel them selves experiencing the learning process when completing challenges. In the process, students feel the emergence of self-confidence, hope and awareness to see the results of their thoughts.

Based on the results of students who have a high learning motivation tends to be more active when the learning process, such as asking questions, diligent work on the problems early to do the problem difficult. Mean while, students who have lower learning motivation are more passive than students who have a high mathematical disposition, never ask questions, easily give up on questions and only make easy questions. This leads to the ability to understand the mathematical concepts of students who have a high mathematical disposition better than students who have medium and low mathematical dispositions, while among students who had low mathematical dispositions and no significant differences.

**4. Conclusion**

Based on data analysis and testing hypotheses that have been conducted, it can be concluded that: 1) There is an influence between group investigation and conventional learning models on mathematical problem solving abilities. 2) There is an influence between learning motivation high,
medium, and low on math problem solving ability. 3) It does not attempt there is interaction between the learner model of an with the motivation to learn about mathematical problem solving.

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