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# THE EFFECT OF DISCOVERY LEARNING METHOD ON THE MATH LEARNING OF THE V SDN 18 STUDENTS OF BANDA ACEH, INDONESIA

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**ABSTRACT:** *Discovery method is a component of educational practice that covers teaching methods that promote the way of active learning, process oriented, self-directed. One of the methods that have been widely used in advanced schools is discovery method. The discovery technique is a translation of discovery. There is influence of discovery learning method toward the mathematics learning result of class V SDN 18 students of Banda Aceh. This is seen from the results of the students' learning taught by discovery learning method is better than the results of students' learning taught by expository.*

**KEYWORDS**: Discovery Learning, Mathematics, Primary School, Assessment

## INTRODUCTION

Discovery learning method is a method of learning that focuses on the students' activity in learning. In this method, the teacher is not only the manager in the class, but moreover the teacher acts as a mentor and facilitator who direct the students in building their own knowledge by giving the problems to be solved through scientific steps. According to Suryosubroto (2009: 178) "Discovery method is a component of educational practice that covers teaching methods that promote the way of active learning, process oriented, self-directed, self-seeking, and relative" so that the learning which is done by self-finding, self-investigating, it will last long in students' memory. The method that recently most used in advanced schools is the discovery method. Learning by using this discovery method is one way that can make the students more active, creative and understand the material and solve the problems that related to the material of space building surface. By finding out themselves the results obtained by the students will last long in memory.

The success of this discovery learning method is in line with the success of discovery learning method implementation in the previous research results by (Yani, 2012: 46) that "the completeness of the student learning outcomes in class IV SD Negeri 50 Banda Aceh with the application of discovery gained satisfactory results". In addition, the success of discovery learning method is also in line with the success of the research conducted by Supriyanto (2014) who concluded that the application of discovery learning can improve the learning outcomes of the 6 Grade students of SDN Tanggung Wetan 2 Jember.

Mathematics is one of the subjects taught in Primary School (SD). Remembering the importance of the mathematics role in everyday life, especially with regard to the development of science and technology and industrial development, the mathematical role cannot be denied anymore by every student who is required to master mathematics which is a very important lesson in primary school learning. Mathematics needs to be given to the students from primary school to equip the students with logical, analytical, systematic, critical and creative thinking



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skills, as well as the ability to work together. Such competencies are necessary so that the students can have the ability to acquire, manage and utilize information to survive in an ever-changing, uncertain and competitive state. In addition, it is also intended to develop the ability to use mathematics in solving the problem and conveying ideas by using appropriate learning methods.

According to Subarinah (2006: 1), mathematics is a science that studies the abstract structures and patterns of relationships that exist in it. The abstract structure in mathematics lessons is still difficult to learn by primary school students, because the stage of thinking is still not formal and still concrete. Mathematics is one of the subjects that have an important role in achieving educational goals, because mathematics is a subject that equips the students to think logically, analytically, systematically, critically and creatively. The success of mathematics learning in the classroom is closely related to the teacher's personality, therefore in the implementation, the teacher is required to have the skills, ductility, and open attitude to the students. Besides that, the teacher is also expected to have the ability to create more active and creative teaching learning situations, encouraging and motivating the students to learn. But the reality in the field, the mathematics learning outcomes in primary school is still low. Various factors that cause low mathematics learning outcomes are the students are still passive in the learning process which means the teacher has not involved the students actively in the learning process. In addition, one of the factors that causes the students' learning outcomes is low in mathematics is due to teaching method and motivation provided by the teacher is less relevant to the students' characteristics. At the time of teaching-learning process takes place, the teachers tend to dominate the learning activities, the teachers become the main source of the students' learning activities, and the activity of the students is less paid attention. The teachers also do not emphasize on the students to reason, see the relevance of the subject matter, communicate and solve the problems, so there is no time for students to develop effective learning strategies. In the learning process, the teachers tend to write on the board and the students record what is delivered. The students' learning creativity tends to listen to the teacher's explanations and record them, and then the teacher gives the exercises with the aim that the students more understand the material that has just been delivered.

Based on the results of preliminary observation conducted in class V SDN 18 of Banda Aceh, it is seen that in teaching mathematics, the teachers have tried to apply some learning methods such as lectures, assignments, discussions, question and answer and there is no learning media used in the learning. This causes the students feel bored, not interested in the learning or the students' learning motivation becomes low, and the students will more quickly forget the learning materials that has just been learned.

## REVIEW OF LITERATURE

### The Nature of Mathematics Learning Assessments

Learning assessments are marks or scores obtained by the students through tests before and after the learning process. The results obtained by the students certainly differ from one to another. This is due to the ability of the students. To obtain good learning assessment, it is influenced by many factors, such as interest, motivation, activity, environment, models, methods, strategies, techniques, and others.



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Sudjana (2010: 22) states that learning assessment are the abilities that students have after receiving their learning experiences. Howard Kingsley in Sudjana (2010: 22) divides learning assessment into three types: (a) skills and habits, (b) knowledge and understanding, (c) attitudes and ideals. Each type of learning assessment can be filled with materials which have been set in the curriculum. According Purwanto (2009: 34) learning assessment is a student's behavior change which is due to learning. The change is sought in the learning process to achieve educational goals. Meanwhile, according to Wingkel in Purwanto (2009: 39) learning assessment is a process in the individual who interacts with the environment to get a change in his behavior. According to Gagne (Purwanto, 2009: 42) learning assessment is the formation of the concept, the category that we give to the stimulus in the environment which provides an organized scheme for the assimilation of new stimuli and determines the relationships within and between the categories. Then the five categories of learning assessment according to Gagne (Sudjana, 2010: 22) are: (a) verbal information, (b) intellectual skills, (c) cognitive strategies, (d) attitudes, and (e) motor skills.

**Understanding of Motivation Learning**

Alderfer (Journal Hamdu & Agustina, 2011: 83) says "motivation is the tendency of the students in learning activities that are driven by the desire to achieve the best achievement or learning assessment. According to Hamalik (2013: 121) "Motivation is the energy in a person characterized by the emergence of feelings and reactions to achieve goals'. Motivation has internal and external components; there is a strong link between motivation, need, and drive, with goals, and incentives. Sardiman (2009: 75) says that 'learning motivation is a non-intellectual psychic factor that has a very distinctive role that is in terms of growing passion, feeling happy and the spirit to learn'. Purwanto (2010: 73) says, "in general the purpose of motivation is to move or arouse a person to arise desire and willingness to do something so as to obtain results or achieve certain goals".

Mc. Donald (in Sardiman, 2011: 73) argues that 'motivation is a change of energy in a person characterized by the emergence of a 'feeling' and preceded by a response to the purpose". From this definition that put forward by Mc. Donald, it contains three important elements, namely (1) Motivation initiates the change of energy in each individual human being. The development of motivation will bring about some energy changes in the "neurophysiological" system that exists in human organisms because it involves changes in human energy (although the motivation comes from within man), the appearance will involve the human's physical activity; (2) Motivation is characterized by the emergence of feeling, affection and emotion that can determine human behavior; (3) Motivation will be stimulated because of the purpose. So motivation in this case is actually a response of an action that is a goal. Motivation arises from human, but its emergence is due to being aroused/driven by the existence of other elements, in this case is the goal. This objective will concern about the need.

**Mathematics Learning in Primary School**

Learning comes from the word 'learn' that is the process of becoming a human whose central role is in the students that is when learning. In the learning process, it contains two activities at once, namely teaching activities (teachers) and learning activities (students). According to Hamalik (2010: 57) "learning is a combination that is composed of human elements, materials, facilities, equipment, and procedures that affect each other to achieve learning objectives". Another opinion put forward by Hamalik (2010: 61) is "learning to teach students using the principle of education and learning theory is a major determinant of educational success".



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Learning is a two-way communication process; teaching is performed by the teacher as an educator, while learning is performed by the students or learners. The concept of learning according to Corey (in Hamalik, 2010: 61) is a process in which a person's environment is deliberately managed to enable him to participate in certain behaviors under specific conditions or to produce responses to specific situations. Learning is a specific subset of education. From the students' learning experience, it can make efforts to resolve the disagreements or social gaps that arise during the learning process. Effective learning will occur when learning opportunities are closely related to the student's life interests in an effort to discover new things continuously.

**Discovery Learning Method**

In the implementing process of learning in school, many of us know the teaching method or technique. One of the methods that have been widely used in advanced schools is discovery method. The discovery technique is a translation of discovery. The initial idea was taken about discovery learning method from Rousseau, Dewey, Piaget, and Bruner. According to Bruner, discovery learning is a cognitive approach in learning where the teachers create situations so that the students can learn themselves. Students learn through active engagement with concepts and principles. Students are encouraged to have experiences and experiments that enable them to find principles or knowledge for themselves.

According to Sund (in Roestiyah, 2008: 20) "discovery is a mental where the students are able to assimilate a concept or principle. What is meant by mental processes include: observing, digesting, understanding, classifying, making guesses, explaining, measuring, making conclusions and so on. Using discovery method is one way of teaching that involves the students in the process of mental activity through the exchange of opinions, with discussions, seminars, self-reading and self-test, so that the children can learn by themselves. The discovery method according to Suryosubroto (2009: 178) is defined as a teaching procedure that emphasizes teaching, individual, object manipulation and others, before it comes to generalization. Meanwhile, according to Sund (in Suryosubroto, 2009: 179) that: "Discovery is a mental process in which the students assimilate a concept or something principle. The mental processes are such as observing, classifying, making conjectures, explaining, measuring, making conclusions, and so forth.

## METHODOLOGY

This study is an experimental study that compares two types of learning methods in terms of student learning assessment. Two groups become the samples, the first group is given the application of discovery learning method and the second group is given the application of expository learning method, as well as to know the existence or absence of interaction between the application of discovery learning method and expository learning with the learning motivation to the mathematics learning result of the V grade students of Primary School.

**Location and Time of Research**

This research will be conducted in class V SDN 18 of Banda Aceh. The reason for conducting a research in the school because the application of discovery method has never been conducted in that place, especially in the study of mathematics on the space building surface that involves various techniques and strategies in finding the formula of space building surface. Based on



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the development of this study, the researcher will conduct a research on February to March of academic year 2016/2017.

### Population and Sample Research

Population is the whole subject imposed in the research. According to Arikunto (2006: 130) who says population is the whole subject of a research. In this study the population is the students of Class V.

## DISCUSSION

### Research result

The results obtained in this study, including the score of learning assessment and the students' motivation questionnaires in the classroom taught by discovery and expository learning methods on mathematical material in the even semester of the academic year 2016/2017.

### Pretest Learning Assessments

In the research stage, the two sample classes are given a pretest to see whether the two classes are normally distributed, homogeneous and have the same initial ability. The similarity of initial capability needs to be seen with the aim that when the two classes are given different treatment there can be significant differences in learning assessment from the same initial ability. The complete result of the calculation is seen in APPENDIX 17. The summary of pretest data of learning result in both classes can be seen as follows.

**Table.1: Pretest Data of the Students' Learning Results**

| **Experiment** | | | **Control** | | |
|---|---|---|---|---|---|
| **Score** | **F** | **F relative (%)** | **Score** | **F** | **F relative (%)** |
| 20 – 28 | 4 | 14,81 | 20 – 27 | 4 | 14,81 |
| 29 – 37 | 6 | 22,22 | 28 – 35 | 3 | 11,11 |
| 38 – 46 | 5 | 18,52 | 36 – 43 | 6 | 22,22 |
| 47 – 55 | 7 | 25,93 | 44 – 51 | 7 | 25,93 |
| 56 – 64 | 3 | 11,11 | 52 – 59 | 5 | 18,52 |
| 65 - 74 | 2 | 7,41 | 60 – 68 | 2 | 7,41 |
| **Total** | **27** | **100** | **Total** | **27** | **100** |
| **Mean** | **44,07** | | **Mean** | **43,18** | |

Table 1 shows that the pretest average of the students' learning result of the experimental class is 44.07 and the pretest average of the control students' learning result of the control class is 43.18. From the average, it can be said that both classes have the same initial ability. In order the later data research results can be analyzed with parametrical statistics, it is necessary to test the assumption or prerequisite. The first requirement is a test of normality. Normality test aims to see the distribution of the student pretest data in the two samples distributed normally or not. The results of normality data test can be seen in table 2. These results were obtained by using the Shapiro - Wilk test with the help of SPSS 16.



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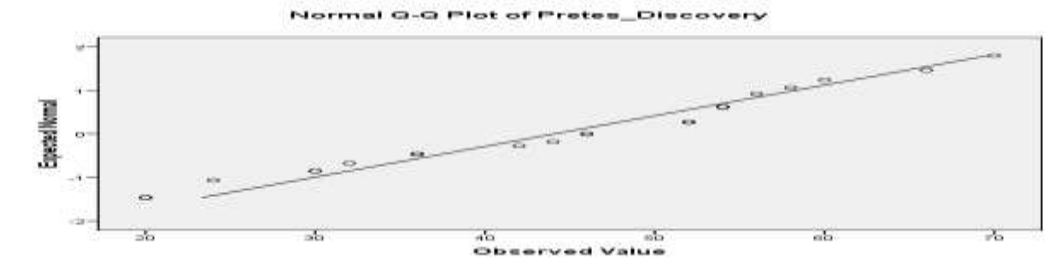
**Table.2: Normality Test of Pretest Data**

| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Experimental Pretest | .156 | 27 | .088 | .951 | 27 | .227 |
| Control Pretest | .165 | 27 | .058 | .947 | 27 | .181 |

a. Lilliefors Significance Correction

Table 2 shows that the normality value of experimental class is 0.951 with the significance of 0.227. Because of the significance is greater than 0.05 then the pretest data of experimental class is normally distributed. Furthermore the normality value of the contraction class of 0.947 with significance of 0.181 because of significance greater than 0.05 then the data pretes control class is normally distributed. Therefore, it can be concluded that the two samples are normally distributed and can be seen in the Q-Q result images of pretest data shown in Figures 1 and 2 can also be used as a reference to see the normality of data. In the figures, it appears that the pretest data in both classes is scattered close to the line. This indicates that the data is normal.

**Figure 1: Q-Q Plot Graphic of Experimental Pretest**



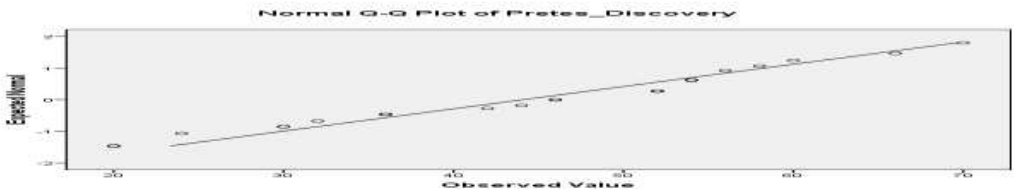
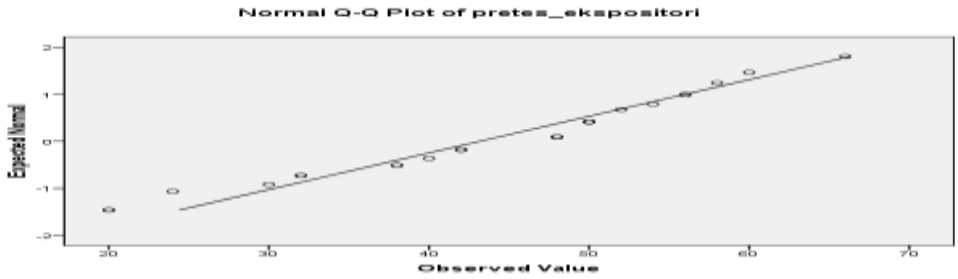




**Figure.2: Plot of Control Pretest**



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After finding out that the data is normally distributed, then it is determined whether the two samples have the same variance. The variance similarity test is done by Test of Homogeneity of Variance by using SPSS 16. The result is presented in table 3.

**Table. 3: Test of Homogeneity of Variances**

Pretest

| **Levene Statistic** | **df1** | **df2** | **Sig.** |
|---|---|---|---|
| .422 | 1 | 52 | .519 |

The test results show that the F value for pretest is 0.422 with a significance of 0.519, This value indicates that pretest data has the same variance because the value of sig.0, 519 > 0,05. In other words the pretest results of both classes are homogeneous. Based on the calculation of normality and homogeneity that has been conducted, it can be concluded that both classes have the same initial ability. The test results show that the data is normal and homogeneous; therefore the research data can be analyzed by Parametric.

**Motivation Questionnaire Results**

Motivation in this study is a variable that will be seen its effect on learning assessment. The complete results of the student motivation can be seen but in summary, it can be seen in Table 4.

**Table 4:Data Results of Motivation Questionnaire**

| ***Discovery Class*** | | | ***Expository Class*** | | |
|---|---|---|---|---|---|
| **Score** | **F** | **F relative** | **Score** | **F** | **F relative** |
| | | (%) | | | (%) |
| 72-75 | 5 | 18,52 | 72-75 | 8 | 29,63 |
| 76-79 | 6 | 22,22 | 76-79 | 3 | 11,11 |
| 80-83 | 2 | 7,407 | 80-83 | 2 | 7,41 |
| 84-87 | 6 | 22,22 | 84-87 | 8 | 29,63 |
| 88-91 | 3 | 11,11 | 88-91 | 4 | 14,81 |
| 92-95 | 5 | 18,52 | 92-95 | 2 | 7,41 |
| **Total** | 27 | 100 | **Total** | 27 | |
| **Average** | 82,59 | | **Average** | 80,89 | |

Next, the students are grouped with high and low motivation in each class. The grouping is conducted on the average motivation of all students. The students with above average motivation scores are classified as *high motivation group*, while students with below average motivation scores are classified as *low motivation group*. The average of total motivation is 81, 74, so the motivation value of > 81,74 belongs to *high motivation* while the motivation value of < 81,74 belongs to *low motivation*. The result of grouping can be seen in Table 5.



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**Table 5: Students Grouping Based on Motivation**

| Learning Method | Motivation | | Learning Method | Motivation | |
|---|---|---|---|---|---|
| | High (H) | Low (L) | | High (H) | Low (L) |
| **Discovery** | 88 | 78 | **Expository** | 88 | 72 |
| | 92 | 80 | | 84 | 80 |
| | 86 | 76 | | 84 | 76 |
| | 94 | 72 | | 92 | 72 |
| | 86 | 74 | | 86 | 72 |
| | 84 | 80 | | 88 | 72 |
| | 88 | 78 | | 84 | 74 |
| | 90 | 76 | | 88 | 74 |
| | 86 | 74 | | 86 | 76 |
| | 92 | 78 | | 88 | 72 |
| | 86 | 72 | | 84 | 80 |
| | 92 | 78 | | 90 | 76 |
| | 94 | 72 | | 84 | 72 |
| | 84 | | | 86 | |
| Total | 1242 | 988 | | 1216 | 968 |
| **N** | 14 | 13 | | 14 | 13 |

Based on table 5 the number of the students with *high motivation* in Discovery class is 14 students and *low motivation* is 13 students. Meanwhile the number of students with *high motivation* in expository class is 14 students and *low motivation* is 13 students. So from 54 students, the total students who have *high motivation* are 28 students and 24 students in *low motivation* are.

The students of SD Negeri 18 Banda Aceh which are as many as 2 classes consist of 54 students, where the V-A class is 27 students and V-B class is 27 students. The sampling technique in this study was conducted by cluster random sampling that is the sample selection refers to the group not to the individual, where the sample is taken by the class drawing that is writing the names of the two classes on the rolled and selected paper. Arikunto (2006: 131) says that sample is part or representative of the population under the study. In this sampling, the researcher is guided by the opinion of Arikunto (2006: 134), which suggests: if the subject is less than 100, it is better to take all so that the research is a population research. But if the number of the subject is large, it can be taken between 10 - 15% or 20 - 25%, depending on the ability of the researcher viewed in terms of time, energy, funds, territory and risk. Because the number of V-A and Grade V-B students of SD Negeri 18 Banda Aceh is 54 students, then the entire population is the sample.

**The Effect of Discovery Method on the Students' Math Learning Results**

Teaching and learning process is an interaction activity between the teachers, the learners and the reciprocal communication that takes place in educational situations to achieve learning objectives. Mutual interaction and communication between the teachers and the learners is the main feature and condition for the ongoing learning process. The process of teaching and learning is not just a communication between the teachers and the learners, but it is an educational interaction that not only delivering the subject matter but also instilling attitudes and values in the learners.



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Many factors influence the student's learning assessment in mathematics subject. One of the factors is the method of learning besides the condition of the students. Mathematics subject has characteristics that emphasize many exercises and self-directed tasks which the orientation is the learning process of seeking the role of the students more dominantly than the role of the teacher and the emergence of creativity. Discovery learning method is perceived to be applicable to adjust the characteristics of the subject.

Discovery learning method emphasizes the cognitive, affective, and psychomotor aspects deeply in the students. The students play an active role in every learning process by finding and digging their own learning materials. In the discovery learning method, students are fully involved in the learning process which means the students are motivated to present their ideas and design ways to test the idea. The application of discovery methods with the students emphasized on combining concepts, principles or rules to be able to solve problems and then put forward the hypothesis. This is in accordance with the troubleshooting procedure steps that have been proposed in the learning of discovery method.

Through the application of discovery learning method, the students can understand a concept clearly, deeply, while developing the critical and creative thinking that they have. In the discovery learning method, the role of the teacher in this learning method poses problems and then presents facts, cases, conditions and examples that reflect a concept or principle to the students. Furthermore, the teacher directs the students to find concepts or ideas that make learning activities through experiences that occur in the students previously obtained about the concepts and principles relating to the teaching materials then used them to solve the problems. The activity of this learning method is more like research activities as usual conducted by experts. Students are led to raise questions or puzzles with questions that can motivate the students and understand the concept more deeply and clearly. The habit of making problems will improve the memory and can develop critical and creative thinking. Overall, the students' activities in formulating will improve the learning assessment.

It's different from expository learning that has been widely used in the classroom learning activities tend to focus on the teacher. Mathematics learning activities take place only a transfer of knowledge from the teacher to the students. This causes the students not actively involved in learning and constructing the knowledge in them. This learning method tends to merely memorize the facts and the concepts without knowing how the facts and the concepts are formed.

In the expository learning method that the lesson is directly transmitted by the teacher to the students by performing a demonstration that involves more of the teacher's role, while the student's discovery learning method is stimulated to express opinions, develop ideas through the role of the teacher as a mentor. In this case the learning activities are not totally dependent on the teacher who is expected a class condition to be interesting and fun.

Based on these thoughts, discovery learning method will give a very big influence on the students' learning assessment in mathematics. The results of the students' mathematics learning taught by discovery learning method is different from results of the students' mathematics learning taught by expository learning method. If the students are taught by discovery learning method, they will produce higher learning result because the students will be more active and able to cooperate, mutual support to empower each other in order to achieve the desired learning objectives. Achieving learning goals through discovery learning will take less time when compared to the use of expository learning methods. Thus, it is assumed that



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the students who are taught by discovery learning method will have a higher learning assessment if it is compared with expository learning methods in mathematics subject.

## CONCLUSION

There is influence of discovery learning method toward the mathematics learning result of class V SDN 18 students of Banda Aceh. This is seen from the results of the students' learning taught by discovery learning method is better than the results of students' learning taught by expository.

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