MATHEMATICS LITERACY BASED ON ADVERSITY QUOTIENT ON THE DISCOVERY LEARNING AND GUILFORD APPROACH

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ABSTRACT

Mathematical literacy is the ability possessed by students to solve problems in daily life. Student's mathematics literacy skills can be increased if the implementation of teaching methods has a good quality. The aims of this study are describing the quality of the learning process, learning effectiveness and describing the mathematical literacy competency based on AQ. Research is conducted by combination methods of concurrent embedded design. Devices that prepared are including Syllabus, Lesson Plan, Student Worksheets, Mathematics Literacy Ability Test (TKLM), observation sheet of theacher skill, observation sheet of student activity, and observation sheet of learning conduction. Quantitative research design used pra experimental design by one group pretest-posttest design. Qualitative research design done by selecting AQ's type using ARP and selected 2 subject with highest and lowest score for each type. Observed in depth, how the matematics literacy skills of each type using TKLM and interviews. Population in the research is VII grade students group in the even Semester of SMP 3 Semarang 2014/2015. Analysis of the data for validity, practicality device, the quality of learning process, mathematics literacy profile based on AQ were analyzed with descriptive statistics. Test the effectiveness of data analysis with the proportion of completeness mathematics literacy ability (KLM) and test average difference of two mean. Analysis of the data was tested with KLM increase normality formula Gain (g). The results showed that the skills of teachers, student activity and learning materialize included in good category, so it can be concluded that the Discovery Learning with Guilford has good quality. Average of student achievement more than 70 and there is an increase of student achievement also, so we can conclude that the Discovery Learning with Guilford is effective. From the analysis of the climber students can solve all mathematical literacy competencies, students camper is only able to complete the reproduction and connections competency, and students quitter type only able to complete reproduction competency.

Key Word: Adversity Quotient, Mathematical Literacy Competency, Mathematical Literacy.

INTRODUCTION

Mathematical literacy should be socialized in school learning because mathematics literacy is the knowledge to know and apply basic mathematics in our every day living. The Organization for Economic Corporation and Development (OECD, 1999) defined mathematics literacy as an individual capacity to identify and understand the role that mathematics plays in the world, to the make well-founded judgments, and to engage in mathematics in ways that meet the needs of that individual's current and future life as a constructive, concerned and reflective citizen. Stacey (2010) conducted a study on science literacy and mathematic literacy. In this study illustrated that science and

mathematic literacy can provide benefits to education and prepare citizens to live a daily life more productive.

Models and approaches are required to familiarize mathematical literacy. The proper models and approach, good quality on learning process may help the achievement of learning goal. Discovery Learning is a learning model that is based on the student finding things out for themselves, looking into problems, and asking questions. Essentially, it's all about students coming to their own conclusions and asking about things in their course that might not make particular sense. Obviously, as soon as enquiries are made, they can learn new things and hence will have become part of an innovative, thought-provoking and interesting educational journey.

Robert B Sund said that Discovery Learning can be defined as the learning that takes place when the student is not presented with subject matter in the final form, but rather is required to organize it him self.(Hamalik, 2001).

Moreover, learning approach also needs to be used in a study. The approach must consider mathematical literacy component. Literacy components not only focus on the process, but also there are the content and context, so it can be concluded that the model and learning approach that focuses on the process of thinking alone is not enough to cope, but the content and the products of the thought process should be included. Browse or type the information given is complete and the product must also be well planned in order to support the thinking of students. Learning model that focuses on the process, the content of what will be in the process, and results after processing will be able to improve the literacy skills of students.

According to Lunenburg (2012), knowledge of Guilford's primary mental abilities is potentially useful in analyzing the kinds of instructional activities practiced and planned. In reflecting on classroom activities, a teacher can determine whether balanced intellectual development is being encouraged. In analyzing curriculum guides and textbooks, a teacher can discover whether balanced intellectual development is an objective, and if it is planned adequately.

According to Guilford's Structure of Intellect (SI) theory, an individual's performance on intelligence tests can be traced back to the underlying mental abilities or factors of intelligence. SI theory comprises up to 150 different intellectual abilities organized along three dimensions, namely Operations, Content, and Products. The first dimension is operating, the operation means how way the information can be processed? The second dimension is the content, the content means type of information that is being processed. The third dimension is products, this dimension means the results of the processing performed by the operating dimensions of the various forms of content or content information. There are 5 kinds of operations, that is cognition, memory, divergent production, convergent production, evaluation. 6 kinds of products, that is units, classes, relations, systems, transformations, and implications. And 5 kinds of contents, that is visual, auditory, symbolic, semantic, behavioral. Dimension on Guildford can be apply in curriculum especially lesson plan (Meeker, 1987).

Besides, each student's situation certainly is not the same. Teachers should know the capabilities of each student in response to the material, solve problems, and resolve problems. Students' ability to respond to the material called the Adversity Quotient, or AQ. Stoltz (2000) defines as the ability Adversity Quotient used to assess the extent to which a person faces a complicated issue and turn it into a challenge to be resolved. Adversity Quotient is the ability to survive in the midst of obstacles and barriers.

According to Oliveros (2014), low AQ students describe low ability students solve problems of mathematics literacy and high AQ students describe the high ability students in solving problems of mathematical literacy. Cura and Gozum (2011) said that the dimensions of Adversity Quotient such as Control, Ownership and Endurance had a significant relationship with the Mathematics achievement of the respondents in the study. The level of Adversity Quotient and the Mathematics Achievement of the respondents were significantly related with one another.

METHODS

This type of research is mixed methods with concurrent embedded models, qualitative method as the primary method. This study was conducted at SMP 3 Semarang. The research was carried out in VII B class in the second semester of academic year 2014/2015. This study began with the determination of the student's AQ type using Adversity Response Profile (ARP). Each category of AQ types was taken 2 students with the highest and lowest scores to be research subjects. Then students were given a pretest to determine students achievement before discovery with Guildford approach was applied. Furthermore, students were given Discovery learning with Guildford approach. During learning, skill of teacher, student activity, and learning materialize are observed by observer team to determine how the quality of the learning process. Next, student were given post test and interview. Post test and pre test were used to determine the effectiveness of Discovery Learning with Guidford approach. Post test and interview were used to analyse mathematical literacy based on type of Adversity Quotient. This analyzing uses 7 indicators from fundamental mathematical capabilities, that is communication; mathematizing; representation; reasoning and argument; devising strategies for solving problems; using symbolic, formal, and technical language and operation; and using matematics tools.

RESULT AND EXPLANATION

1. *Quality of The Learning Process*

From the Table 1, we know that teacher's skill average score is 30.75. The scores exist in good category, or in other words the teacher has good skills on Discovery Learning with Guildford approach. Teacher should have a good skill because teacher have important role in education. So that teacher's skill can affect the quality of learning process. Student activity gets 31,935 on average score and student activity are in the good category also. It means students are active in Discovery Learning with Guildford approach. In line with Prasad's (2011) research which says that Discovery Learning provides students with an opportunity to take active part in teaching learning processes. Average score of learning conduction is 31,5. The scores are in the good category, in other words every learning step is done well. The third data exist on good category, so we can conclude that Discovery Learning with Guildford approach has a good quality in learning process.

Tabel 1. Quality of The Learing Process

	Average Score	Category	Precentage
Teacher's skill	30,75	Good	76,87%
Student Activity	31,935	Good	79,83%
Learning Conduction	31,5	Good	78,75%

2. *Result of the Effectiveness Model of Discovery Learning with Guildford Approach*

The results of the development of learning tools can be said to be effective, because it has been tested on experimental class obtained results. (1) The results of the pretest represents an average value of 32, the average post test 78. Classical completeness test gives results that the proportion of students in the class has achieved of KKM over 75%. (2) The mean difference test gives results mean KLM students after applying Discovery Learning with Guildford approach better than before. (3) Results of tests of normality gain calculation showed an increase of 0.307 in the medium category.

3. *Improvement Mathematical Literacy After Discovery Learning with Guildford Aproach Applied*

Quitter

The Diagram 1 shows that improvement of literacy skills only occurs on reproduction and connections competency. On reproduction competence, improving the mathematics literacy skills is present in all indicators except using symbolic, formal, and operation indicator. On the competence of connections, the highest increasing in the ability of the indicators contained in the communication, mathematising, representation and reasoning and argument. Improved literacy skills of mathematics at several indicators is evidence that Quitter can develop through the Discovery Learning with Guilford approach. However, when viewed in further improvement of the existing competencies each connection classified have a poor ability.
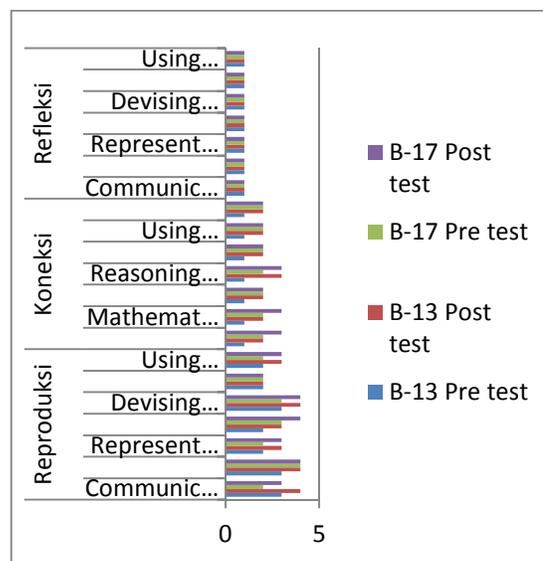

Diagram.1 Mathematics Literacy Skills of Quitter

Camper

On reproduction competency, 6 of the 7 indicators have improvement, there is only one indicator that no increasing, that is using symbolic indicator. On connection competency, all indicators have improvement. In general, the type of Camper have good mathematical literacy skills in reproduction and connection competency. And the last, on reflection competency, there are improvement in all indicators however still in a poor category.
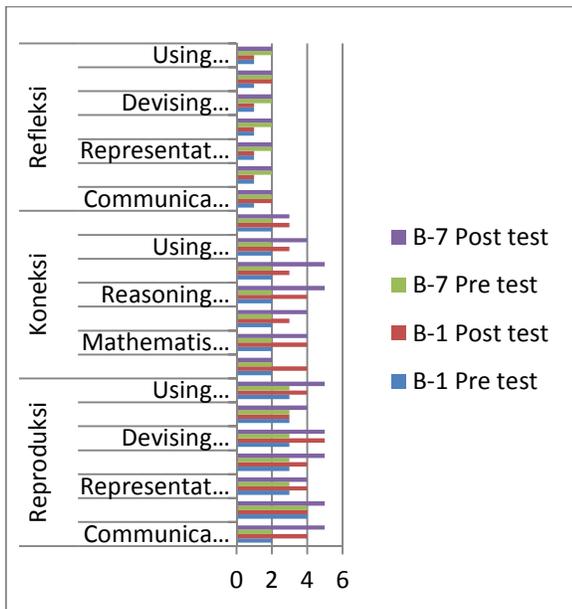
Diagram.2 Mathematics Literacy Skills of Camper

Diagram.3 Mathematics Literacy Skills of Climber

Climber

On reproduction competence to reflection, this Climber types of students increased in all indicators. On reflection competency, Climber has very high improvement, this is because when the pretest test Climber students did not answer the question at all, so that literacy skills are not visible at all. Then when postest, Climber answer all problems.
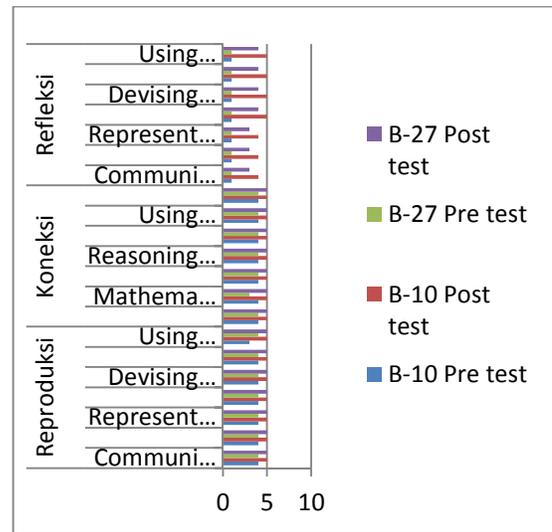
Improvement mathematics literacy skills indicates that the student is able to see things that are difficult or unfamiliar becomes easier, so it can improve the achievement on literacy competency. The results are similar to Akanmu (2013) which shows that learning strategies Discovery Learning can assist in the ability of learners to look simple from something complex. Trang (2014) said that The effectiveness of the new method is better than traditional methods. Burns and Alvin (1990) reseach show that SOI by Guildford is more comprehensive than Bloom's Taxonomy.

4. **Mathematics Literacy Profile Viewed From AQ**

Tabel.2 Mathematics Literacy Score

Type	Student	Competency Score			Total Score
		Reproduction	Connection	Reflection	
Quitter	B-13	23	15	7	45
	B-17	23	17	7	47
Camper	B-7	28	24	9	61
	B-1	33	27	14	74
Climber	B-10	35	35	32	102
	B-27	35	35	28	98

In reproduction competency, quitter type has a poor ability in two indicators, that is using symbolic and formal and technical language and operation. Six other indicators has a good ability. In connection competency, quitter has a poor ability in six indicators, and only has a worth ability in 1 indicator, that is reasoning and argument. In reflection competency, quitter has a poor ability in all indicators. From the table we know that quitter has highest score only in reproduction competency, and low score in connection and reflection competency. It means, quitter only answer question in reproduction competency.

Camper type has a good ability in all indicators when solve reproduction and connection competency's problems. Such as the quitter type, camper has a poor ability in all indicators when solve reflection competency's problems. From the table we know that camper has highest score only in reproduction competency. Although connection competency's score less than reproduction competency, camper can solve

connection competency's problems. It means, camper only able to solve reproduction and connection's problems.

Climber is the best type of AQ, climber can solve all question in all competencies. Climber can give reason and argument in a difficult problem. Below is an example of the students' answers on the problems of reflection competency.
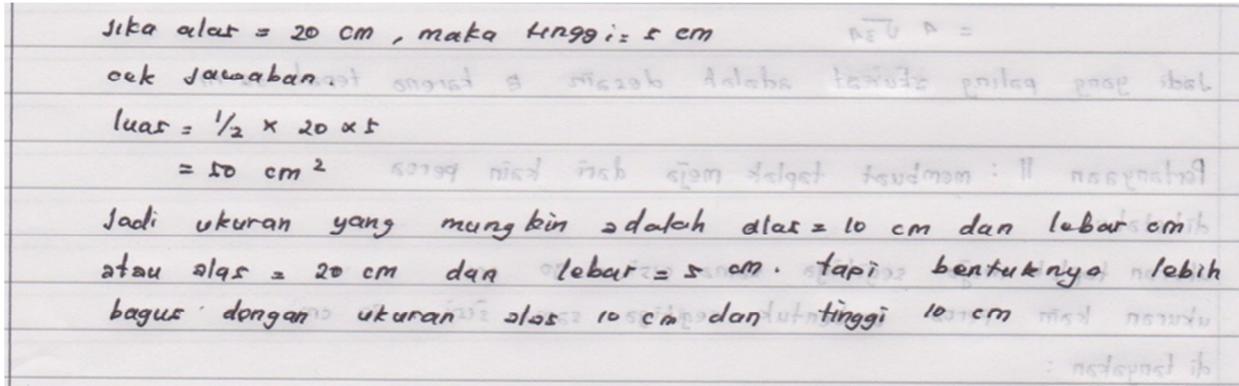
Picture 1. Climbers on Reason and Argument Indicator

Based on the Picture 1, we know that climber can give reasoning and argument, mathematizing, and communication. Whereas, reflection is about the most difficult.

Based on total score, students climber types have the highest scores, camper has a score below climber, and the Quitter has the lowest scores. In line with the research of William (2003) which states that students who have a high AQ will have better learning outcomes than students who have low AQ. Cura and Gozum (2011) also says that AQ influence the mathematics achievement.

CONCLUSION

The conclusion of this study are as follows, (1) Discovery Learning with Guildford approach has a good quality in learning process. (2) Discovery Learning with Guildford approach effective for improving mathematics literacy ability. (3) students climber types have the highest scores, camper has a score below climber, and the Quitter has the lowest scores. The suggestion of this study are as follows, (1) Teachers should integrate learning Discovery Learning and Guildford approach into learning process. (2) applying LEAD to improve mathematics literacy skill.

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