



## Students Mathematical Literacy ability Judging from the Adversity Quotient and Gender in Problem Based Learning Assisted Edmodo

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### Abstract

This study aims to determine the effectiveness of PBL assisted by Edmodo on students' mathematical literacy skills and find the mathematical literacy patterns of students reviewed adversity quotient (AQ) and Gender. This study uses a mixed method with embedded concurrent design. Sample of this study were 8<sup>th</sup> grade students of SMP IT Insan Cendekia 2017/2018 school year. The results showed that students with Edmodo-assisted PBL learning achieved better and better than students on PBL. The pattern of literacy ability of male climber type students is able to master the aspects of communication, mathematics, representation, reasoning and giving reasons, designing strategies for problem solving, use of symbols, formal language, practice and operations. Climber type female students are able to master aspects of communication, mathematics, representation, reasoning and giving reasons, designing problem solving strategies. Camper type male students master the aspects of communication, mathematics, representation, reasoning and giving reasons, designing strategies to solve problems, use symbols, formal language, practice and operate well. Camper type female students master aspects of communication, reasoning and giving reasons and designing problem solving strategies. Quitter type students are only able to master the aspects of communication, reasoning and giving reasons. Quitter type female students master aspects of communication, representation, reasoning and giving reasons.

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## INTRODUCTION

Mathematics is seen as one of the lessons that plays an important role in developing potential and forming quality students in the development of science and technology. Junaedi & Asikin (2012) explain mathematics learning needs to be designed in such a way that it is able to encourage students to have mathematical skills, such as the ability to understand, communicate, connect, reason and solve mathematical problems. This ability is needed by students to use information and apply it in everyday life.

The achievement of Indonesian students' mathematics literacy scores is below the international average score of 500. In 2000 the achievement of Indonesian students' mathematical literacy aged 15 was ranked 39 out of 41 countries. Indonesian students on PISA held in 2003 literacy achievements were ranked 38 out of 40 countries. In 2006 the mathematics literacy of Indonesian students was ranked 50th out of 57 countries. In 2009 the mathematics literacy of Indonesian students was ranked 61 out of 65 countries, and in 2012 the achievement of mathematical literacy of Indonesian students was ranked 64th out of 65 countries. The results of the PISA study in 2015 showed that the achievement of literacy skills of Indonesian students was ranked 62 out of 70 countries (OECD, 2016). The 2015 PISA results show that Indonesian students' mathematical literacy skills have increased even though the scores achieved are far from the international average scores and are still in the low category.

Three interconnected aspects based on PISA 2012 mathematical literacy are (1) Process capability in PISA is defined as a person's ability to formulate, employ, and interpret (mathematics) mathematics to solve problems. (2) Components of content in the PISA study are interpreted as content or

mathematical subjects or subjects studied at school. The material tested in the content component based on the 2012 PISA draft framework assessment includes changes and relationships (change and relationship), space and shape, quantity, and data uncertainty (uncertainty and data). The context component in the PISA study is used as a situation that is reflected in a problem. Literacy is one of the objects being discussed and the field of study in several countries. The Turkish state also conducts research on mathematical literacy skills. The results of research in Turkey show that the concept of mathematical literacy and its relationship to the real world are not completely different, but actually complement each other (OZgen, 2013). Meanwhile, in the country of Sweden conducted research on students' mathematical mastery of mathematical literacy skills. The study found that students experience difficulties in math assignments that contain numbers and story problems (Sandström, Nilsson, & Lilja, 2013).

Learning mathematics has different challenges. Learning is presented with contextual problems, students work in groups to solve real world problems (real world) (Hidayah, Sugiarto & Sutarto). To change the difficulties at each challenge, each student has a difference. One of the factors that influence is the ability of AQ. AQ is a problem solving intelligence (fighting power), namely the intelligence of a person in the face of the difficulties that confront him (Sudarman, 2012). A similar mathematical problem is given to several individuals, so they will get different responses in solving problems. The thing that can make a difference is gender differences. Women and men have different patterns in solving mathematical problems. Because many mathematical problems in standardized tests are multi-step and require several systematic approaches, students can find the right solution by selecting and combining a set of appropriate strategies. Flexibility strategies

are important for successful performance on standardized tests (Gallagher, et al. 2000). While the results of research conducted by MZ & Zubaidah (2011) say that there is no difference in mathematical creative thinking skills, communication skills of female and male students. Based on the foregoing description, the purpose of this study are: (1) to examine and determine the effectiveness of the Edmodo-assisted PBL model on student literacy and (2) find student literacy based on AQ and gender.

**METHODS**

This research is a kind of mixed methods research with concurrent embedded design. According to Sugiyono (2015) concurrent embedded design is a research method that combines the use of quantitative and qualitative methods simultaneously or together (or vice versa), but the weight of the method is different. The selection of research subjects using random sampling technique. The subjects used as data sources were experimental group students consisting of 2 students from the climber category consisting of male and female students, 2 students from the camper category consisted of male and female students, 2 students from the quitter category consisted from male students and female students.

The data used in this study are the results of the ARP questionnaire (adversity response profile), the results of tests of students' mathematical literacy skills and the results of interviews. Data collection methods in this study were tests, questionnaires, interviews and documentation. Mathematical literacy research subjects were identified with indicators on 6 components of mathematical literacy. Data analysis conducted in this study included analysis of quantitative data and qualitative data analysis. Quantitative data analysis was carried out to determine

the effectiveness of learning with PBL models assisted by Edmodo on students' mathematical literacy abilities based on the ability of AQ and gender on material pattern numbers. While qualitative data analysis was carried out to determine students' mathematical literacy abilities based on AQ and gender abilities in PBL learning assisted by Edmodo both during learning, when examining test results, and when analyzing the results of interviews with selected students.

**RESULTS AND DISCUSSION**

Based on the preliminary analysis of the research, it shows that the group of students with PBL learning assisted by Edmodo and groups of students with PBL learning depart from the same conditions, that is after the normality, homogeneity test shows that the two samples are normally distributed and there is no significant difference in variance and test the similarity of averages that show both samples have similarities.

The results of the tests on the ability of mathematics literacy Quantity content based on learning are presented in table 1 as follows.

**Table 1.** Summary of results for Mathematics Literacy Proficiency Test

No.	Description	class Experiment	classroom Control
1	Average	76.16	70.12
2	The highest	95	82
3	score	55	43
4	The lowest value standard deviation	8.392	5.462
	Learners completed flats	30 2	27 8
	Learners are not completed flats		

The first analysis carried out in the final data was the effectiveness test of PBL learning Edmodo assisted students' mathematical literacy skills. Average due diligence based on the minimum completeness criteria (KKM) of individuals with the aim to see the average mathematical literacy ability of students reaching the complete limit or not. The average completeness test of mathematical literacy skills with PBL learning assisted by Edmodo uses an average test of one party by analyzing one Sample T-Test with a significant level of 5%. The average test results show significance =  $0.00 < 0.05$  which means that students' mathematical literacy abilities with PBL learning assisted by Edmodo are above the minimum completeness criteria. Furthermore, the classical completeness test is a test to see whether the proportion of experimental class students exceeds 75% or not. From the calculation of the proportion test obtained the value of  $Z_{count} = 3.23$ . The value of  $Z_{(0.5-\alpha)} = Z_{(0.5-0.05)} = Z_{0.45} = 1.64$ . The value of  $Z = 3.23 > Z_{0.45} = 1.64$ , which means the completeness of learning in a classical manner on the average value of the mathematics literacy ability of class students with PBL assisted by Edmodo has exceeded 75%.

The average difference test is used to determine the average mathematical literacy ability of the experimental class students equal or less than the control class students. The mean difference test uses an analysis of independent sample T-test. The value of  $t$  is significant in the Equal variances assumed output row,  $t = 0.001 < 0.05$ , which means that there is a significant difference between students' mathematical literacy abilities and PBL learning assisted by Edmodo with students' mathematical literacy skills with PBL learning. Finally, the proportional difference test was used to determine the differences in the number of students who

reached the completeness of mathematical literacy skills in Edmodo-assisted PBL models and the number of students who achieved the completeness of mathematical literacy skills in the PBL model. Different proportional tests in this study used the Z test. From the calculation using the different proportion test formula TKLM final test experimental class and control class, obtained  $Z_{count} = 3.009 > z_{0.05} = 1,645$  which means the proportion of completeness of students' mathematical literacy skills in the experimental class is more than the proportion of students' mathematical literacy skills in the control class.

#### **Description of Mathematical Literacy Capabilities Viewed from AQ and Gender. Climber Type Student Mathematical Literacy Skills.**

Climber male and female students on the communication aspect are able to identify important information on the question and be able to explain again what is known, the problem being asked, and the concept of problem solving problems correctly and correctly. This is consistent with the research of Chanifah (2013) who said that the subject of climber can understand the problem and be able to reveal the information given to the problem and be able to retell it with its own discussion. Mathematical aspects, have the ability to change problems in the form of mathematical models to illustrate the problem becomes simpler.

Representative aspects, male and female students do different ways of presenting (representation) a problem or a mathematical object. This difference can be seen in the restatement of the problem. Male students present in a row of numbers while female students make an example on each line using algebraic symbols. This is in accordance with the research conducted by Fuad (2016) which states that female students at the stage of implementing

problem solving are represented in the form of mathematical equations and algebraic symbols. Aspects of reasoning and giving reasons, both students can solve problems according to concepts that have been planned correctly and completely, make final conclusions and explain in detail about the solutions made. This is different from the results of research conducted by Nafi'ah (2011) which states that men are superior in reasoning while women are superior in accuracy, accuracy, precision, and precision thinking.

Aspect of designing a problem solving strategy, both students as a whole can plan strategies to solve problems systematically. This can be seen from the ability of students to use the formula of odd number patterns and triangle number patterns as well as foresight in seeing the difference between the numbers of numbers. This is in accordance with the results of Mena's research, Lukito, Yuli & Siswono (2016) which says that climber students in designing and implementing strategies find mathematical solutions, by writing down what is known, asking questions, writing the formula to be used, replacing variables with known values into the formula and apply count operations and concepts that were previously known. This is also in accordance with the results of Stolz's (2005) study which says that climber really likes challenges and they are thinkers who always think of possibilities. As for the aspects of using symbols, formal, technical and operating languages, overall female students are able to understand, interpret, manipulate and use mathematical symbols in problem solving compared to male students.

#### **Camper Type Student Literacy Ability**

Male and female students in the communication aspect are able to identify what is known and asked questions smoothly and correctly and are able to reconcile problems with their own sentences, so it can

be concluded that male and female students are able to communicate the problem very well. This is in accordance with the results of the study of Widyastuti (2013) which states that camper students are able to identify things that are known and asked, develop a problem solving plan and implement. Zubaidah (2013) said there was no difference in both aspects of creative thinking ability and communication skills between male and female students. In the mathematical aspect, male students are able to use important information such as what is known and asked questions to make mathematical models. However, female students are not able to use the information available to make mathematical models. This is in line with the opinion of Ismawati, Mulyono & Hindiarto (2017) which states that students from AQ camper can understand and utilize information from a problem to solve. This is also in line with the results of Stolz's (2005) study that camper students are willing to accept challenges, even if they stop or feel quite there.

Representative aspects, male and female students are both in restating (representation) a problem or a mathematical object but not complete. One of the 3 questions that contain representations, female students are not able to change problems into mathematical models so that difficulties in representing these problems. This is in line with the results of Ismawati's research, Mulyono & Hindarto (2017) which says that some AQ camper students cannot solve mathematical problems by utilizing prerequisite knowledge. While the reasoning and reasoning aspects, male and female students alike can solve problems according to concepts that have been planned correctly and completely, make final conclusions and explain in detail about the solutions made.

Aspects of designing problem solving strategies, male and female students as a whole can plan strategies to solve problems

systematically even though they are incomplete because all questions contain aspects of designing a problem solving strategy. Both students are able to identify what is known, what is asked, apply what strategies are used, and use the right formula in solving questions. This is consistent with the results of Stolz's (2005) study which said that camper students still had a number of initiatives, a little enthusiasm and some effort. Whereas, in the aspect of using symbols, formal, technical and operating languages, overall male students are able to understand, interpret, manipulate and use mathematical symbols even though there are uses of several operations and false signs.

#### **Quitter Type Mathematical Literacy Skills**

Male and female students in the communication aspect, can communicate the questions quite well. But on the mathematical aspect, both students both had difficulty in making mathematical models. This is in line with the results of the study, which is in line with the results of Stolz (2005) who said that quitters only work enough to solve problems. However, on the mathematical aspect male students are not able to formulate problems, identify important variables that are used to solve problems so that difficulties in restating the problem. In contrast to female students who are able to identify important information so that students are able to choose the right symbol and present problems in table form. Whereas, the reasoning and reasoning aspects, the two students can solve the problem according to the concept that has been planned correctly even though it is not complete, make final conclusions and explain in detail about the solution made.

All questions contain aspects of designing a problem solving strategy. There are a number of questions they cannot solve properly because they are unable to design the strategies used to solve the problem.

However, on other questions they are able to plan strategies to solve problems systematically even though there is a lack of detail from each student. While in the aspect of using symbols, formal, technical and operational languages, overall male students did not make mathematical models so they did not use symbols but were able to use the correct techniques and operations so that the final results obtained were correct. Unlike female students who use symbols in solving problems because students involve the ability to use symbols, formal language and operations. In addition, students use the right formula and apply multiplication and addition operations with good techniques.

#### **CONCLUSION**

Based on the results of the study, it can be concluded that PBL assisted by Edmodo is effective on students' mathematical literacy abilities indicated by students with PBL learning assisted by Edmodo to achieve completion and student mathematical literacy in PBL assisted Edmodo better than students on PBL. Students' mathematical literacy abilities in PBL assisted by Edmodo are better than students' mathematical literacy skills in PBL. Climber type students show literacy skills in good categories. This can be seen from climber type male students able to master the indicators of communication, mathematical, representation, reasoning and argumentation, symbol use, operations and mathematical techniques and designing problem solving strategies. Whereas climber type female students are able to master indicators of communication, mathematics, representation, reasoning and arguments and design problem solving strategies. Mathematical literacy ability of camper type students shows quite good categories. Camper type male students are able to master indicators of communication, mathematical,

representation, reasoning and arguments, use of symbols, mathematical operations and techniques and design strategies for problem solving well while camper type female students are able to master indicators of communication, mathematical, representational, reasoning and argument while for the aspects of mathematics and the use of symbols, formal languages, techniques and operations, designing strategies to solve problems needs to be improved. Mathematical literacy skills of students of the quitter type are still relatively low compared to the mathematical literacy abilities of the climber and camper types of both male and female students. Quitter type students are only able to master 2 aspects of literacy well, namely communication and reasoning aspects and give reasons, while for mathematical aspects, representation, designing strategies in problem solving, aspects of using symbols, formal language, practice and operations are still very lacking. Quitter type female students are able to master aspects of communication, representation, reasoning and giving reasons.

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