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by 38 Wardono

Submission date: 14-Apr-2023 07:38PM (UTC+0700)
Submission ID: 2064362968
File name: 38.pdf (477.51K)
Word count: 3574
Character count: 20953

UJMER 8 (2) (2019) 188 - 194

Unnes Journal of Mathematics Education Research

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Mathematical Literacy Ability Viewed from Student Engagement on Formulate Share Listen Create Model with Reciprocal Teaching Approach Assisted by Edmodo

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Article Info

Article History:
Received 15 September 2018
Accepted: 14 January 2019
Published: 23 December 2019

Keywords:
mathematical literacy ability; engagement; FSLC; reciprocal teaching; Edmodo

Abstract

The aims of this study were to determine the effectiveness of formulate share listen create (FSLC) model with reciprocal teaching approach assisted by Edmodo towards the achievement of students' mathematical literacy ability and describe the profile of students' mathematical literacy ability based on their engagement groups. This research was mix-methods sequential explanatory design study. The population was 7th grade students of SMP N 4 Semarang in the academic year 2017/2018. The research subjects were determined based on the group of student engagement consisting of upper, middle and lower groups. Data were obtained from engagement questionnaire, mathematical literacy ability test and interview. The results showed that FSLC model with reciprocal teaching approach assisted by Edmodo was effective towards the achievement of students' mathematical literacy ability. In general, the profile of students' mathematical literacy can be stated as follows. The upper group students mastered communication, mathematisation, representation, reasoning and argument, and devising strategy well. Students with middle engagement group could master communication, mathematisation, representation, devising strategy well. While the lower engagement group, students mastered the representation quite well, but they mastered devising strategy and using symbols / languages / operations component in different way. By paying attention to student engagement, teachers can design the right learning strategy according to students circumstances.

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p-ISSN 2252-6455
e-ISSN 2502-4507

INTRODUCTION

Literacy has now received attention in Indonesia education from elementary high school. According to Muhammad (2016), literacy is the ability to access, understand, and use things intelligently through various activities, one of them is reading. The importance of literacy ability is also necessary in mathematics. Students which have good mathematical literacy ability are expected to know the role of mathematics in solving problems in real life (OECD, 2012).

In everyday life, it is generally faced with a number of situations when shopping, traveling, cooking, managing finances, etc which need mathematics to solve the problem. (Lange, 2006). Thus, mathematical literacy ability are very important. The PISA results in 2012 and 2016 show that students' mathematical literacy ability in Indonesia are still below the average level.

Based on PISA, mathematical literacy can be divided into 3 domains, those are process, content and context (OECD, 2012). The process domain consists of formulating real situations into mathematics form, employing mathematical concepts, and interpreting and evaluating the results obtained. The domain of content relates to learning mathematics in schools which includes change and relationships, space and shape, quantity, also uncertainty and data. While the context domain discuss of real problems in everyday life. The classification of the mathematical literacy context in PISA is personal, occupational, societal/general, and scientific.

The weak ability of Indonesian students to work on the PISA problem is because the school have not can become a "school of thought" yet for them (Wardono et al, 2016). As stated by Jablonka (2003) that mathematical literacy is related to learning how to think, not learning what to think about. Mastering mathematical literacy, especially when in the process domain, 7 important components are needed, those are communication, mathematisation, representation, reasoning and argument, devising strategy, using symbols/languanges/operations of mathematics, also using mathematical tool (OECD, 2012). Then, innovation in learning strategy is needed that facilitates students discussing and solving real problems.

One of those learning strategies is FSLC model with reciprocal teaching approach assisted by Edmodo. This learning also utilizes technology which defined by Crompton as quoted by Bray (2015) as learning with social interaction and content with the benefit of personal electronic devices. Students can learn not only face-to-face at school, but use application to keep discussing with friends and asking the teacher at home. Edmodo is a free and easy site to be used by teachers and students in cyberspace (Wardono et al, 2018). The purpose of FSLC model with reciprocal teaching approach assisted by Edmodo is students can always actively involved in mathematics learning inside and outside the school.

The actual involvement of students in learning is called engagement. Shernoff (2003) states that student engagement can be known through concentration, attraction, and comfortness when receiving learning. Reschly & Christenson (2012) explain that engagement can be assessed in a continuum or continua way. Continuum defines engagement as one dimension (from lower to upper) while continua separates between engagement and disengagement / disaffection into two dimensions (with each dimension valued from lower to upper). This study looks at engagement in a continuum so that students' engagement will be divided into three groups, namely upper, middle, and lower.

Based on the description above, it is necessary to do research on mathematical literacy ability viewed from student engagement on FSLC model with reciprocal teaching approach assisted by Edmodo. The purpose of this study focuses on (1) knowing the effectiveness of FSLC model with the reciprocal teaching approach assisted by Edmodo on the ability of mathematical literacy which shown through a) mathematical literacy ability of experimental class students achieving individual and classical completeness; b) the average of mathematical literacy ability of the experimental class is better than the control class; (2) desrcribe the profile of mathematical literacy ability based on student engagement groups.

METHODS

This research is a mix-methods sequential explanatory design where quantitative methods implemented first. The study population was 7th grade students of SMP N 4 Semarang. The sample were 7th F as a control class that received discovery learning model with scientific approach and 7th H that received FSLC model with reciprocal teaching approach assisted by Edmodo. The material was perimeter and area of quadrilaterals and triangles. The research subjects were selected based on the upper, middle and lower engagement groups within each group consisted of 2 students.

The data collection technique that used consist of test and non-test. The test technique is a test of students' mathematical literacy ability consisting of pre-test and post-test. Non-test techniques in the form of engagement questionnaire and interview guidelines. The control class and experiment carried out a pre test of mathematical literacy ability before receiving the learning process. The experimental class also filled the engagement questionnaire.

The pre-test results were analyzed as prerequisite tests which included normality tests, homogeneity tests and average similarity tests to ensure that the selected samples had the same initial mathematical literacy ability. Engagement questionnaires are calculated in order to determine students engagement groups. Then the learning was held and in the end of the lesson a post test was carried out followed by a hypothesis test.

Hypothesis test that consist of, the average completeness test of individual mathematical literacy ability, classical completeness test, average difference test. Selected research subjects would be interviewed about the results of the post test in order to describe the students' mathematical literacy profile based on their engagement groups.

RESULT AND DISCUSSION

One of the aims of this study was to determine the effectiveness of the FSLC learning model in the reciprocal teaching approach assisted by Edmodo. The results the pre-test data of the analysis show that the two samples are normally distributed and homogeneous. In addition, students' mathematical literacy ability in the experimental class and the control class are the same. Then the learning was held during 4 meetings by discussing the perimeter and area of the quadrilateral and the triangle as well as the exercises to sharpen the students' mathematical literacy ability. At the last meeting, students did post-test to obtain the final data on students' mathematical literacy ability. The final data prerequisite test results are normally distributed and homogeneous.

The first hypothesis to be tested is about the completeness of learning in the experimental class students. This test consist of 2 test, those are the t test to find out the minimum completeness individually and the z test to know completeness classically. The results obtained as shown in Table 1 below.

Table 1. Completeness Test Results

Average	Result Test	Interpretation
72,05	$t = 5.97$ $t_{table} = 1.69$ $z = 2.11$ $z_{table} = 1.64$	Completed

The minimum completeness that used in this study is 62. From the results of Table 1, the value of $t > t_{table}$ means that the experimental class students can achieve completeness individually with values exceeding 62. It also can be seen in the z test that the value of $z > z_{table}$ means proportions the completeness of the value of students' mathematical literacy ability in the experimental class exceeding 70% clasically. The final data shows that there were 31 students who reach the minimum completeness and 5 others who failed or it could be said 86.11% of students passed the minimum completeness.

Based on the result of t test and z test, it can be said that the experimental class students have achieved individual and classical completeness. This result is in line with the research established by Aini et al (2015) that students given FSLC model can achieve completeness both individually and classically. Agoestanto (2012) and Nerru et al (2013) stated that with reciprocal teaching students were able to achieve classical completeness. Wardono & Kurniasih (2015) examined that learning with Edmodo supports students achieving classical completeness.

The second hypothesis is about the average differences of mathematical literacy ability in the

experimental class and the control class. Based on t test for independent samples, the results are shown in Table 2.

Table 2. Value Recapitulation and Average Test of Mathematical Literacy Ability

Information	Experiment	Control
Average	72.05	63.17
Std. deviation	9.17	11.04
The Lowest Score	58	42
The higest score	92	86
Result t test	$t = 3{,}64$ $t_{table} = 1{,}67$	
Interpretation	Experiment is better	

From Table 2, it is known the average value of students in the experimental class looks better than the control class. In line with this, the results of t test shown that $t > t_{table}$, it means that the average mathematical literacy ability of the experimental class students is better than the control class.

This result is supported by the statement of Anggraeni & Sumarmo (2013) that the FSLC model has advantages in the communication section which make the learning process more effective. Afrilianto (2014) and Juariah & Sari (2015) state that through FSLC model, student learning achievement is better than ordinary learning. The reciprocal teaching approach strongly supports students to understand a problem carefully so they can their errors in solving problems. The statement is supported by Riza'i (2018) that reciprocal teaching helps students get better learning achievements.

Furthermore, the learning startegy in this study was assisted by e-learning Edmodo. According to Amidi (2014) the class that receives learning with the help of e-learning gets better learning achievements. More specifically, Sujadi et al (2017) stated that Edmodo helps students to learn. Wardono et al (2016) stated that the use of Edmodo support some progress in students' mathematical literacy ability. Via Edmodo, students will practice not only at school because according to Al-Kathiri (2015) that the use of Edmodo makes students have a better learning spirit.

In this study, mathematical literacy was described based on seven components as mentioned earlier. From the results of the post-test and interviews with the subjects, the profile of students' mathematical literacy ability were described based on the engagement groups they had.

Two students from upper group mastered different components of mathematical literacy ability. In general, E-08 and E-36 mastered communication, mathematisation, representation, reasoning and argument, and devising strategy. More specifically, E-08 mastered six components. One component that still lack is using mathematics tool. The tool in this study is ruler. She did not write the scale used in the sketch even though during skeching process she thought about the appropriate size.

Subject E-36 mastered generally the five components of mathematical literacy ability as mentioned, although in fact in reasoning and argument sometimes he was still in doubt. Two components that have not been mastered were using symbols / languages / operations and using mathematics tools. In the use of symbols / operations he had obstacle in inaccuracy to equalize units so that the resulting solution is incorrect. For the use of tools, the E-36 states that sometimes it is not necessary to use ruler because that can shorten the time to draw the sketch. It caused the sketch he made was not presentable.

Two students in the middle group namely E-21 and E-25 both mastered five components of mathematical literacy in different ways. E-21 has problems with reasoning and argument and using symbols / language / operations. The obstacle for reasoning and argument is too long thinking process to determine the idea of solving problems for certain questions that are considered quite difficult. Whereas in using symbols / languages / operations, E-21 sometimes have inaccuracies in writing the symbols of operation and units that ambiguous. For E-25 the difficulties faced are in mastering the components of reasoning and argumentat also using mathematics tools. On reasoning and argumentation, the constraints was the same as E-21. In terms of using the tool, the E-25 does not write the scale used in drawing so that the sketch is not presentable.

Two students from the lower group mastered two components. Mastery is only in enough category because inconsistency depending on the difficulty level of the problem. The E-17 mastered representating and using symbols / languages / operations because if there is an error during the interview E-17 is able to realize and correct it. While the E-30 mastered representation and determine

strategy. Sometimes duirng representating process, she is still incomplete in giving information on the sketch made. For other components, it is still very much in need of assistance from the teacher and her group friends.

The analysis above are supported by Finn & Zimmer's (2012) and Griffiths (2012) statement, which also states that students with upper group engagement tend to have high opportunities for their learning achievement. Students need to be more engaged in learning because according to Griffiths (2012) students who cannot engage in learning tend not to complete their tasks well and learn less from their group friends.

From the result, we know that the lower group has not mastered mathematisation. Based on Wardono (2017) that the mathematisation process is modeling a phenomenon into a mathematical form. This means that mathematisation requires appropriate mathematical modeling to solve the real problems. Gatabi as quoted by Haara et al (2017) states that mathematical model is the key of mathematical literacy which certainly starts from the existence of real problems. Furthermore, Widyaswara & Pertiwi (2018) states that the mathematisation process of students varies depending on students' perceptions of the context problem. Students need to be given real problems in order to develop their mathematical literacy ability optimally. This is supported by the statement of Setiani et al (2018) that the use of real problems makes mathematical literacy ability better in the learning process.

CONCLUSION

Based on the results and discussion, conclusions can be stated as follows. FSLC model with reciprocal teaching approach assisted by Edmodo effective on mathematical literacy ability showed by (1) mathematical literacy ability of experimental class students achieving individual and classical completeness; (2) the average of mathematical literacy ability of students on FSLC model with reciprocal teaching approach assisted by Edmodo is better than students on discovery learning with scientific approach.

Selected students with upper engagement group mastered communication, mathematisation, representation, reasoning and argument, devising strategy, one of them mastered using symbols / language / operations. Selected students with middle engagement group mastered communication, mathematisation, representation, devising strategy, one of them mastered using symbols / language / operations, the other one mastered using mathematical tools. Selected students with lower engagement group have sufficient mastery of representation, one of them mastered devising strategy, and some mastered using symbols / language / operations.

From the statement above, FSLC model with reciprocal teaching approach assisted by Edmodo needs to be applied in learning perimeter and area of quadrilaterals and the other materials that require a lot of discussion to solve the real problem. By paying attention to student engagement during mathematics learning, the teachers can devise the exact learning strategy which make mathematics learning enjoyable and relate to the real problems in order to develop students' mathematical literacy ability.

ACKNOWLEDGEMENT

The author would like to thank all for helping, especially to Mr. Soejono, M.Pd as the mathematics teacher of SMP N 4 Semarang, as well as students of 7th F and 7th H of SMP N 4 Semarang.

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