Mathematical Literacy Based On Entrepreneurial Character Students on Problem Based Learning Nuance of Mathematics In Context

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Article Info	Abstract
	This study aims to determine the effectiveness of Problem Based Learning with the nuances of Mathematics in Context on mathematical literacy and describe mathematical literacy in terms of the entrepreneurial character of students. This study uses a mixed method with concurrent embedded. Subjects of this study were X^{th} grade students of SMK Pelayaran Semarang 2017/2018 school year. The subject of the study was based on the categories of students' initial entrepreneurial character, namely students with the characteristics of high, middle and low entrepreneurs. Qualitative data were analyzed by the average completeness test, classical completeness test, average difference test and improvement test. Quantitative data were analyzed using data triangulation techniques. The results of the study show that Problem Based Learning with nuances of Mathematics in Context is effective for students' mathematical literacy. Students with high entrepreneur character can achieve indicators of Communication, Mathematising, Representation, Reasoning and Argument and Devising Strategies for Solving Problems, although indicators Using mathematics tools and Using symbolic, formal, and technical language have insignificant errors.

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INTRODUCTION

Education plays a role in ensuring the continuity of life and development of a nation. One of the problems often faced by developing countries such as Indonesia is poverty and unemployment. Improving the quality of Human Resources that are able to compete globally both in terms of mind, expertise and skills as a way to overcome these problems (Rahmah & Mahmud, 2015). Mulyani (2011) states that education must be able to produce quality output in the field of science and be able to create independence for students to be able to work in offices and open their own jobs.

In the last decade, the Government has been aggressively promoting SMK as a continuation after graduating from junior high school or equivalent. The aim of establishing SMK is to create human resources who are ready to work and able to create jobs according to their skills and talents. But the fact is that some SMK graduates have not been able to show their readiness for entrepreneurship, most of the SMK graduates choose to work with other people and only a few choose to become entrepreneurs. The unpreparedness of students in entrepreneurship is because the implementation of entrepreneurship learning taught in schools is still limited to the concept of entrepreneurial theory (Siti Nurbaya, 2012). Marvin & Flora (2014) states that entrepreneurship can encourage the economy and have benefits in creating jobs for people who cannot work both in government institutions and private companies. Usman and Raharjo (2012) revealed that SMK become schools that teach various skills that have the ability to produce goods and services at an efficient cost and the competitiveness of SMK graduates in bargaining.

One of the mathematical abilities that is able to identify and understand the role of mathematics in everyday life is mathematical literacy. The mathematical literacy of Indonesian students in TIMSS 2011 data shows that the average acquisition score in mathematics subjects is in the lower order. Indonesia was ranked 38 out of 45 countries with a score of 386 from the highest international score of 613 in the overall mathematics lesson. Mathematical literacy has not received more attention. Some abilities in mathematics need to get a deeper study, including mathematical literacy skills (Aydin, 2010).

Mathematical literacy as knowledge to know and apply basic mathematics in everyday life, the ability to read or write is the main competency that is very much needed in carrying out daily activities (Ojose, 2011). Literacy is more than the ability to read, write, speak and use language (Martin:2007). Mathematical literacy is the ability of a person to formulate, use and interpret mathematics in a variety of contexts including mathematical reasoning and using mathematical concepts, procedures, facts and tools in explaining and predicting phenomena to help one recognize the role of mathematics in the world and make judgments and decisions needed as citizens (OECD, 2013; Johar, 2012; Stacey, 2010).

Mathematics according to Maretasani & Dwijanto (2016) is not just a science related to a set of numbers, concepts, formulas, theorems, logic, images and steps that must be memorized to solve a problem but also knowledge that has a role in daily life day. Fitriyani & Zaenuri (2017) states that the material and examples of questions given by the teacher are related to daily life so students know the usefulness of the material being studied with its application in daily life so that it will improve the problem solving in the classroom.

Most Indonesian students still feel difficulty in learning mathematics, especially in trigonometry material. Shofiah, Lukito, & Siswono (2018) state that students consider trigonometry as a subject that contains memorized formulas that are difficult to understand and solve mathematical problems such as understanding problems, choosing approaches or problem solving strategies, completing models and interpreting solutions.

Problem Based Learning is one of the good learning models to improve learning outcomes, especially trigonometric material. According to Geni & Hidayah (2017) that Problem Based Learning with ethnomatematic nuances gives the opportunity for students to play an active role in the learning process and the application of Problem Based Learning with ethnomatics nuances can improve students' problem solving skills, especially in sine rules, cosine rules, and broad triangle rules. Robert (2013) argues that *Problem Based Learning is describes as an approach to structuring the curriculum which involves confronting students with problems from practice which provide a stimulus for learning.* Setiyadi, Zaenuri, & Mulyono (2018), Abdullah, Zaenuri, & Sutarto (2015) state that

Problem Based Learning can increase students' activeness to find formulas, understand formulas or algorithms that will be used to solve problems, discuss problems to solve, present results discussion in front of the class, creating a pleasant learning atmosphere. The activity of students is marked by the number of students who ask questions related to the material, discussions that go well, and students do the tasks given by the teacher to the maximum and earnest.

The teacher needs to associate the learning material with real life which is discussed in the mathematics application material so that students can feel the importance of learning mathematics and will get the deep meaning of the learning they do. Supriatna & Supartono (2017) said that SMK students who get learning with the Problem Based Learning model with Entrepreneurial approach Pedagogy experience increased interest in learning mathematics because the mathematical material presented is related to their field of competence. One alternative that can be taken to improve meaningfulness in learning is to apply learning that has nuances of Mathematics in Context.

Mathematics in Context introduces concepts in realistic contexts that support mathematical abstraction. Students are expected to explore the relationship of mathematics, develop and explain reasons and strategies to solve their own problems, use appropriate problem solving tools, and listen to, understand and value each other's strategies.

Mathematic in Context emphasizes dynamic, active character of mathematics, how to enable students to understand their world, introducing concepts in realistic contexts that support mathematical abstraction. Students are expected to explore the relationship of mathematics, develop and explain their own reasoning and strategies to solve problems, use appropriate problem solving tools, and listen, understand, and value the strategies of each (Fasha:2017).

In the PMRI learning process with media Schoology will train students to get used to understanding the concepts given and can provide reasons for the context of the problem and train students in summarizing information and being able to improve mathematical literacy skill (Wardono & Mariani:2018). PMRI-Scientific Based Problem Learning Model uses developing ICT that is valid, practical, effective and can improve mathematical literacy skills and independence of junior high school students (Wardono, Waluya, Kartono, Mulyono, & Mariani:2018).

This study focuses on the characteristics of entrepreneurial characters according to Robert D. Hisrich dan Michael P. Peters (2002:66-67). The characteristics of a person who is characterized by an entrepreneur are having *internal locus of control, need for achievement* and *need for independence*. Grouping students based on the character of high, middle and low entrepreneurs.

Based on the benefits, Mathematic In Context is suitable to be juxtaposed with the Problem Based Learning model to improve students' mathematical literacy. The formulation of the problem in this study is 1) how the effectiveness of the Problem Based Learning model has the nuances of Mathematics in Context effective on student mathematical literacy, and 2) how students' mathematical literacy in learning with Problem Based Learning models nuanced Mathematics in Context in terms of entrepreneurial character.

Based on these problems, the objectives to be achieved in this study were to determine the effectiveness of Problem Based Learning models with Mathematics in Context nuances in improving students' mathematical literacy and student mathematical literacy in learning with Problem Based Learning models nuanced Mathematics in Context in terms of entrepreneurial character.

METHODS

The type of study used is mixed methods (mixed of quantitative and qualitative). Data collection is done with embeddded concurrent strategies, namely study strategies that combine the use of quantitative and qualitative study together, but with different weights (Cresswell, 2014). Quantitative study uses primary methods to obtain primary data and qualitative study uses secondary methods to obtain data that supports the primary method. This study begins with the collection and processing of quantitative data and ends with qualitative data collection

This study was conducted at SMK Pelayaran Semarang 2017/2018 Academic Year in Even Semester. The design of this study uses experimental

and control classes. The study population was all students of class X. Class X Nautika-1 as the experimental class and class X Nautika-2 as the control class So only the experimental class was given treatment. The study design as presented in Figure 1.
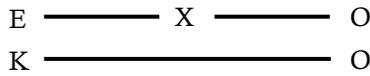
E ——————— X ——————— O
K ————————————————— O

Figure 1. Study Design (Creswell, 2014)
Keterangan:
E : Experimental Class
K : Control Class
X : Giving Problem Based Learning with the nuances of Mathematics in Context
O : Provision of Mathematics Literacy Tests and Entrepreneurial Questionnaires

This study uses several stages, namely the pre-study stage and the study stage. The activities carried out in the pre-study phase began with compiling a study design, selecting study schools, arranging permits, preparing instruments such as syllabus, lesson plans, teaching materials, worksheets, mathematical literacy tests and entrepreneur questionnaires. All instruments were consulted by a team of experts before being used for study.

Activities carried out at the study stage begin with the selection of samples consisting of 1 experimental class (class X Nautika-1) and 1 control class (class X Nautika-2). In the experimental class, giving students a mathematical literacy test to determine the initial ability of mathematical literacy. Furthermore, giving entrepreneur character questionnaire to students to find out the entrepreneur character before learning. The results of the questionnaire were then grouped into high, middle and low categories. Furthermore, each of the students in the high, middle and low categories was chosen by 2 students to be seen mathematical literacy. The quantitative data of the initial abilities included normality tests, homogeneity tests and two average similarity tests.

The experimental class uses Problem Based Learning in the nuances of Mathematics in Context and the control class using Problem Based Learning in the teaching process. Furthermore, the researchers conducted four mathematics lessons on trigonometry in the experimental and control classes. After all competencies have been taught in the experimental and control classes, students are given a mathematical literacy test to learn more about

students' mathematical literacy. Furthermore, in the experimental class, students are given entrepreneur character questionnaires to see entrepreneurial character after learning. Quantitative data on the final ability include the average completeness test, classical completeness test, average difference test, improvement test and paired sample t-test.

The results of the final mathematical literacy tests that students work on will be analyzed using data triangulation techniques along with the results of teacher interviews along with the six qualitative research subjects. Qualitative data is analyzed by reducing data, presenting data, concluding data that has been collected and verifying the conclusions.

RESULT AND DISCUSSION

This study examines the effectiveness of the Problem Based Learning model with the nuances of Mathematics in Context on mathematical literacy and describes mathematical literacy in terms of the entrepreneurial character of students.

The mathematics literacy test is carried out twice, before the learning is given a pretest and after the learning is done, it is given the posttest. From the results of the pretest and posttest of mathematical literacy students have seen an increase in mathematical literacy students have before Problem Based Learning model nuances of Mathematics in Context with mathematical literacy students have after Problem Based Learning model learning nuanced Mathematics in Context. The data pretest of student mathematics literacy is presented at Table 1.

Table 1. Pretest Data on Mathematical Literacy of Experimental and Control Class

No	Descriptions	Experimental Class	Control Class
1	Many students	25	25
2	Means	28.60	30.00
3	Maximum Value	15	16
4	Minimum Value	45	47
5	Varians	78.833	103.083
6	Standard Deviation	8.879	10.153

At the based stage, the researcher conducted preliminary data testing. The results of the analysis are that data taken is normally distributed, has the same variance and there is no difference in the

average mathematical literacy of students from the two samples. Researcher conducted the study four times. At the end of the meeting, the researcher took the final data with a math literacy test. The data from the final results of mathematical literacy are presented in Table 2.

Table 2. Posttest Data on Mathematical Literacy of Experimental and Control Class

No	Descriptions	Experimental Class	Control Class
1	Many students	25	25
2	Means	79.48	76.92
3	Maximum	87	84
4	Value	71	69
5	Minimum Value	28.927	25.827
6	Varians Standard Deviation	5.378	5.082

The average completeness test aims to find out the mathematical literacy of students reaching the minimum learning completeness (KBM) or not. This test uses one sample t test with the help of SPSS 16.0 with a significance level of 5%. From the results of SPSS 16.0 output obtained a significance value of 0% <5% then stated H_0 is rejected. This means that the average mathematical literacy value of the experimental class students reaches the KBM (KBM = 75).

The classical completeness test aims to determine the number of students who complete 75% in one class. Based on the results of the classical completeness test calculation obtained the value of z_{count} = 1.95, and the value of z_{table} = $z_{0.5-\alpha}$ = 1.64. From z_{count} = 1.84 > $z_{0.5-\alpha}$ = 1.64 then H_0 is rejected. This means that the proportion of students who get Problem Based Learning model with nuances of Mathematics in Context has reached 75%.

Based on the two tests above, it can be concluded that Problem Based Learning learning with the nuances of Mathematics in Context is able to improve students' mathematical literacy to achieve KBM and complete it classically. This is due to Problem Based Learning with Mathematics in Context nuances helping students to improve the development of lifelong learning skills in an open, reflective, critical and active learning mindset.

Test the difference in average to determine whether there is a difference in students 'mathematics literacy in the class with Problem Based Learning models with Mathematics in Context nuances and students' mathematics literacy in the class with the Problem Based Learning model. Based on table 2, it can be seen that the average value of the experimental class is 79.48 and the control class is 76.92. This shows that there are differences in the average mathematical literacy between the experimental class and the control class. This is confirmed by the average difference testing using the independent sample t test assisted by SPSS 16.0 with a significance level of 5%. From the results of SPSS 16.0 output obtained a significance value of 0.009 <0.05, then H_0 is rejected, meaning the mathematical literacy average of students in the Problem Based Learning model with nuances of Mathematics in Context more than the students' mathematical literacy average in the PBL class. This is in line with the opinion of Fasha (2017) who tested the ability and creative thinking skills in mathematics learning using the Mathematics in Context approach. The results showed a significant increase in the average ability of creative thinking students in mathematics learning with the approach of Mathematics in Context flat wake material and there was an increase in creative thinking skills in mathematics learning with the Mathematics in Context approach to flat-waking matter.

The test results of the average mathematical literacy based on individual teaching and learning, classical completeness test, and different tests of students' average mathematical literacy show that Problem Based Learning learning has the nuances of Mathematics in Context effective on mathematical literacy.

This improvement test aims to find out the higher class of improvement between Problem Based Learning classes with Mathematics in Context nuances with Problem Based Learning classes. The mathematical literacy test is carried out twice, namely before the learning is given a pretest, and after the learning is carried out the posttest is given. From the results of the pretest and posttest literacy, it can be seen the improvement of students 'mathematical literacy before Problem Based Learning model with the nuances of Mathematics in Context with students' mathematical literacy after Problem Based Learning

model with nuanced Mathematics in Context. Table 3 describes the improvement of students' mathematical literacy.

Table 3. Average Student Mathematics Literacy Difference

Class	Many students	Pretest Average	Posttest Average	Difference Average
Problem Based Learning with nuance of Mathematics in Context	25	28.60	79.48	50.88
PBL	25	30.00	76.92	46.92

Improvement test using independent sample t test assisted by SPSS 16.0 with a significance level of 5%. From the results of SPSS 16.0 output obtained a significance value of 0.034 < 0.05, then H_0 is rejected, meaning an increase in mathematical literacy of students who get Problem Based Learning learning nuances Mathematics in Context higher than the increase in mathematical literacy of students who get the Problem Based Learning learning model.

The different test of two paired samples in this study aims to see whether there is an influence between the character of entrepreneurs and students' mathematical literacy. The data used are entrepreneurial character of students before and after Problem Based Learning models with nuances of Mathematics in Context. Data on entrepreneur character possessed by students is obtained from the results of giving questionnaires filled with students.

Analysis of the influence of entrepreneurial characters on students' mathematical literacy using the SPSS 16.0 assisted Paired Sample T-Test. From the results of SPSS 16.0 output obtained a significance value of 0,000 <0,05, then H_0 is rejected, meaning that there are differences in entrepreneurial character before and after Problem Based Learning model with nuances of Mathematics in Context. Data on entrepreneurial character possessed by research subjects are shown in Table 4 below.

Tabel 4. Score of Entrepreneur Characters on Research Subjects

No	Student Code	Pretest score	Criteria	Posttest score	Criteria
1.	E-14	118	High	128	High
2.	E-21	112	High	125	High
3.	E-10	64	Low	91	Middle
4.	E-16	61	Low	84	Middle

Based on the results of the final entrepreneur character evaluation, 6 students were used as research subjects, namely 2 subjects in high entrepreneurship categories, E-14 and E-21. Subjects in the category of middle entrepreneur characters are E-06 and E-08. Subjects in the category of low entrepreneur characters are E-10 and E-16. Furthermore, 6 students representing each category of emotional intelligence will be examined more deeply about mathematical literacy skills through the final TLM answer sheet and interview.

Students selected as study subjects in high entrepreneur character groups are E-14 and E-21. After participating in mathematics learning with Problem Based Learning with the nuances of Mathematics in Context, both students experienced an increase in the score of entrepreneur character. The initial score of subject E14 from 118 was the final score of 128. The initial score of E-21 subjects from 112 was the final score of 125. Both subjects were stable in the high character entrepreneur group. The scores of students' E-14 and E-21 mathematical literacy abilities showed good achievements in the components of Communication, Mathematising, Representation, Reasoning and Argument and Devising Strategies for Solving Problems while on components Using Symbolic Formal and Technical Operation and Using Mathematical Tools showed poor performance.

Students selected as research subjects in middle entrepreneur character groups are E-06 and E-08. After attending mathematics learning with Problem Based Learning learning with Mathematics in Context nuances, the two students experienced an increase in entrepreneur character scores. Students E-06 and E-08 who initially had a middle entrepreneurial character, after participating in learning experienced an increase in the score of entrepreneur character to a high category. The scores of students' mathematical literacy abilities E-06 and

E-08 showed good achievements in the components of Communication, Mathematising, Reasoning and Argument and Devising Strategies for Solving Problems while in the Representation component, Using Symbolic Formal and Technical Operation and Using Mathematical Tools showed poor.

Students selected as research subjects in low entrepreneur character groups are E-10 and E-16. After attending mathematics learning with Problem Based Learning learning with Mathematics in Context nuances, the two students experienced an increase in entrepreneur character scores. E-10 and E-16 students who initially had a low entrepreneurial character, after participating in learning experienced an increase in entrepreneur character scores into a middle category. The scores of mathematical literacy abilities of E-10 and E-16 students showed good achievement in communication components, whereas in Mathematising, Representation, Reasoning and Argument and Devising Strategies for Solving Components Using Symbolic Formal and Technical Operations and Using Mathematical Tools showed poor performance.

From the results of the study, it can be seen that there are significant differences between students who are characterized by medium entrepreneurs and students who are characterized by low entrepreneurship in achieving the components of mathematical literacy. The researcher further investigated the significant differences through the interview method. Researcher conducted further interviews on E-10 and E-16 research subjects as well as grade X mathematics teachers related to unsatisfactory mathematics learning outcomes especially in achieving one component of mathematical literacy which was well mastered by research subjects. Based on the results of interviews between researchers and research subjects, it can be concluded that the learning outcomes of research subjects are less satisfactory due to the following factors: 1) low achievement motivation, 2) discipline, 3) learning style.

A person who has the character of a low entrepreneur means that he or she is less convinced that success is the result of his own ability and failure as a result of the less than optimal effort. This causes a person not to master the basic mathematical abilities because this ability requires a person's belief in translating everyday language into mathematical form. According to Freudenthal (1991) that mathematics is not a subject that is ready for students, but a dynamic lesson that can be learned by doing it in a process called mathematics. Students in solving mathematical problems are always mathematical processes, students will use various strategies. This requires the belief that the things done will succeed if the business is done maximally.

Achievement motivation possessed by research subjects is quite low. This is because the subject of research is only limited to learning and doing things ordered by the teacher without having a strong desire for achievement. This is consistent with the opinion of Daryati (2016), Sahidin & Jamil (2013) that people who are motivated by the needs of high achievement will set goals with high standards of success and perfection so that a student has good achievement motivation then he will get considerable opportunities in obtaining maximum learning outcomes compared to students who have poor achievement motivation.

The discipline of the research subjects is quite low. This is because the research subjects lived in boarding houses which caused less discipline in learning. There are no research subjects that remind to study every day. This is in accordance with the opinion of Prasasty (2017) that without self-discipline even though it has extraordinary talent he will only appear mediocre and if someone has high discipline then the results of learning are also good.

Learning styles or learning strategies possessed by research subjects are quite low. This is because the research subjects lived in boarding houses which caused the learning method to be less effective. Less effective means that students only learn when having homework, students learn while joking with other students in the school. This is in accordance with the opinion of Indrawati (2013) that a good way of learning will lead to successful learning, whereas a bad way of learning will lead to lack of success or failure to learn. The poor way of learning is one of the factors that causes low learning outcomes, causing a decline in the quality of education.

CONCLUSION AND RECOMMENDATION

Based on the results of the study it can be concluded that 1) Problem Based Learning learning nuances of Mathematics in Context is effective against students' mathematical literacy; 2) Students

who have high entrepreneurial character can achieve all indicators of mathematical literacy even though some indicators of mathematical literacy exist with insignificant errors. Students who have entrepreneurial characteristics on each indicator of mathematical literacy have a significant error. Students who have low entrepreneurial character cannot achieve some indicators of mathematical literacy properly.

The results of this study are used as input for teachers and prospective teachers in fixing themselves in relation to the teaching that has been done and student achievement that has been achieved by paying attention to the appropriate learning model to improve students' mathematics learning achievement. In the learning process, teachers should often provide questions relating to daily life to improve students' mathematical literacy and develop affective aspects, especially entrepreneurial characters to facilitate students in solving mathematical literacy problems.

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