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Mathematical Literacy Ability in Experiential Learning with Performance Assessment Based on Self-Efficacy

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Abstract

Mathematical literacy skills and self-efficacy are important for students to have in learning mathematics. To be able to help improve mathematical literacy and self-efficacy skills, a learning model is needed, namely experiential learning with performance assessment. This study aims to (1) analyze the quality of experiential learning models with performance assessment based on self-efficacy on mathematical literacy abilities, (2) describe students' mathematical literacy abilities on experiential learning with performance assessment based on self-efficacy. The method in this study is mixed methods with a concurrent embedded strategy, namely the qualitative method as the primary method. The population in this study were all students of class VII MTs N 2 Semarang by taking a sample of students VII-D as an experimental class and VII-E as a control class. Research data were analyzed by t test. The results showed that the average mathematics literacy ability of students in the experiential learning model learning class based on self-efficacy was more than the average mathematics literacy ability of students in the Discovery Learning class. Students who have low self-efficacy have not mastered the components of the mathematics literacy process to the maximum, students who have moderate self-efficacy are only able to master the ability to use mathematic tools and the other components of the mathematical literacy process are quite good. Students who have high self-efficacy are able to master the seven components of the process of mathematical literacy even though there are still two components whose completion is less than optimal.

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INTRODUCTION

Mathematics is a universal science that underlies the development of technology, has an important role in various disciplines and develops the power of human thought. Mathematics is studied and developed to shape the ability of students to think logically, rationally, analytically, systematically, critically, and creatively (Wadono, et al, 2015).

Ojose (2011) defines mathematical literacy as knowledge to know and apply basic mathematics in everyday life. The importance of mathematics literacy skills has not been matched by Indonesia's achievements in mathematics. This can be seen from the results of Indonesia's participation in the main international scale assessment, the PISA (Program for International Student Assessment). The results of Indonesian mathematical literacy at PISA in 2015 were followed by 70 countries, the average score of mathematics literacy obtained by Indonesia was better than the previous year's score of 386 and ranked Indonesia 63rd (OECD, 2016).

One of the factors causing the low mathematical literacy ability of students is that Indonesian students are less trained in solving problems that have contextual substance, demanding reasoning, argumentation and creativity in their completion (Wardhani & Rumiati, 2011).

The learning process, the process of change using experience as a medium of learning or learning is called experiential learning. Experiential learning emphasizes experience as the main role in the learning process. Students are invited to discover new concepts through a combination of existing knowledge with new experiences in the learning process (Rahmawati, J., et al, 2013). As stated by Hamalik (2009) that experiential learning gives learners a series of learning situations in the form of true experience involvement by the teacher. The new experience can be in the form of formula discovery by manipulation of props. It is important to make learning a meaningful and personal experience by encouraging students to use their minds rather than merely receiving information (Rogers, 1983: 113). Other forms of experiential learning, such as field trips and learning services, can also be effective experiences (Zeichner, 2010). One of them is through experiential learning which later by David Kolb became a learning model and this model will be used in organizing learning in this study. Kolb (1984) defines Experiential learning as "a process in which knowledge is created through the transformation of experience". The experiential learning model consists of four phases, namely concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb & Kolb, 2005). Can be interpreted according to this theory, learning as a process where knowledge is created through the transformation of experience. The learning procedure in experiential learning consists of four stages, namely (1) the real experience stage, (2) the reflection observation stage, (3) the conceptualization stage, (4) the experimentation stage (Baharuddin & Wahyuni, 2007).

In the 2013 curriculum, it was said that in learning mathematics, mathematical hard skills and soft skills including the education of cultural and character values must be developed together and balanced through learning with a scientific approach, one of these mathematical soft skills is self-efficacy (Lestari DI et al, 2020). Although mathematics has benefits for everyday life, there are still many students who think that mathematics is a difficult and frightening subject (Kuswidyanarko et al, 2017). Students' confidence in their ability to face challenges is often referred to as self-efficacy. According to Bandura (1994), self-efficacy is a person's belief about their ability to produce levels of performance that affect their lives. Self-efficacy is an assessment of students' abilities in determining beliefs and choices, striving for progress, persistence and perseverance in the face of difficulties, degrees of anxiety or calmness in maintaining a task (Nadia et al, 2017; Sunaryo, 2017; Damaryanti et al, 2017; Taubah et al. 2018). Self-efficacy provides motivation to improve learning methods, learning achievement outcomes, and problem solving (Zimmerman, 2000; Motlagh et al., 2011; Martalyna et al, 2018).

Self-efficacy comes from four things, namely direct experience, the experience of others, social or verbal approaches and psychological indices (Bandura in Somakin, 2012).

The use of appropriate learning models in the learning process must be supported by appropriate assessments so that they are in accordance with previously planned learning goals (Susanti E., et al, 2020). Masrukan (2014) states that assessment is a systematic procedure with the aim of gathering information about the characteristics of people or objects. This is also supported by Tejeda & Katherina (2017) who revealed that by using performance

appraisals, it can find out whether students can relate their knowledge to real life situations. In addition, performance assessment is an assessment based on observers' observations of student activities as they occur (Suryati, et al 2013). Handayani, et al (2013), Hasanah, et al (2016), & Emiliannur, et al (2018) argue that performance appraisal can be used to assist students in solving problems related to daily life and be able to measure student success because it will accustom students to actively participate in learning by showing their performance in understanding and solving problems.

Based on the problems that have been explained, research is needed on the quality of experiential learning models with performance assessment based on self-efficacy on mathematical literacy abilities. and describe students' mathematical literacy skills in experiential learning with performance performance based on self-efficacy assessments.

METHOD

This type of research is a mixture of qualitative and quantitative methods, also known as mixed methods, Sugiyono (2015). The strategy used is the "concurrent embedded strategy" which implements one stage of collecting quantitative and qualitative data at a time with qualitative methods as primary methods and quantitative methods as secondary methods.

Researchers provide treatment in the experimental class with experiential learning and discovery learning in the control class. In this study as the independent variable (X) is self-efficacy and the dependent variable (Y) is the ability of mathematical literacy.

The first stage of the study was to determine the initial conditions using the questionnaire method, observation and tests to obtain student self-efficacy data, and students' mathematical literacy abilities. Furthermore, the data were analyzed qualitatively so that the grouping of subjects was obtained into 3 groups, namely: High Group Students (SKA), Moderate Group Students (SKT), and Low Group Students (SKB).

Qualitative data analysis was performed to obtain mathematical literacy skills and self-efficacy through observation and interview methods for 6 selected students. While quantitative data analysis is done to test the effectiveness of learning. Then the overall analysis of the data analysis is done to get a conclusion and a suggestion.

RESULTS AND DISCUSSION

Based on the scale of self-efficacy with questionnaires and questionnaires can be grouped into 3 namely the high, moderate and low groups using the standard deviation method that is limiting groups by standard deviations. From 30 students the group division is found in table 1.

Table 1. Grouping Results of Student Self-Efficacy

No	Group	Number of Student	Score
1	High	4	19 – 25
2	Moderate	20	10 – 18
3	Low	6	0 – 9

From this grouping, 6 students were selected who were examined more deeply through the method of observation and interviews. Students selected in the SKA category (high) are students with SS-07 and SS-30 codes, for the SKT category (moderate) are students with SS-20 and SS-01 codes while students with SS-27 and SS-08 codes enter SKB category (low).

The results of the assessment of the validator are analyzed based on the average score given by the validator. A summary of the results of the validator's assessment of learning tools is in Table 2.

Table 2. Results of the Validator Assessment on Learning Tools

Tools / Instrument	Average score	Category
Syllabus	4,30	Very Good
Lesson plans	4,10	Good
Teaching materials	4,26	Very Good
Problem sheets	4,25	Very Good

A summary of the results of the validator's assessment of the assessment instructions is in table 3.

Table 3. Results of Validator Assessment on Assessment Instruments

Tools / Instrument	Average score	Category
Self Efficacy Questionnaire	4.50	Very Good
Self Efficacy Observation	4.50	Very Good
Preliminary TKLM questions	4.25	Very Good
The Final TKLM Problem	4.23	Very Good
Mathematical Literacy Interview Guidelines	4.13	Good
Observation Observation Sheet Learning	4.30	Very Good
Student Response Questionnaire	4.10	Good

Based on the results of the assessment of the validator, obtained an average value for learning tools and research instruments included in both good and very good categories so that the planning stage can be said to be of good quality.

At the implementation stage, measuring the quality of experiential learning model learning based on self-efficacy is carried out by carrying out observations of the implementation of learning and giving questionnaires to student responses. Learning is said to be of quality if the results of observations of the implementation of learning in the minimal category are good.

A summary of the results of the observer's assessment of the learning outcomes is given in Table 4.

Table 4. Learning Outcomes Results

Implementation	Average score	Category
Meeting 1	84.0%	Good
Meeting 2	85.3%	Good
Meeting 3	88.0%	Very Good
Meeting 4	89.3%	Very Good
Meeting 5	91.3%	Very Good

Descriptive statistics of the final data on the mathematical literacy ability of class students learning experiential learning models based on self efficacy and discovery learning class learning are in table 5.

Table 5. Descriptive Statistics of Student Mathematics Literacy Ability Data

Descriptive Statistics	Experiment	Control
Average	82.47	73.68
Variance	62.06	102.43
Standard Deviation	7.88	10.12

The average test of mathematical literacy skills using the t test, the test results obtained obtained t_count = 5.36 while t_ (table) = t_ ((0.95; 31)) = 1.6603. From the calculation because t_count> t_tabel so H0 is rejected. That is, the mathematics literacy ability of classroom students on learning experiential learning models based on self efficacy reaches 75.

In the test of the proportion of mathematical literacy ability completeness obtained z_count = 2.0412 and z_tabel = 1.64. From the calculation because z_count ≥z_tabel so H0 is rejected. This means that the percentage of students who achieved a minimum completeness of 75 in the experiential learning model learning class based on self efficacy reached 75%. So the ability of mathematical literacy that obtains experiential learning model learning based on self efficacy reaches mastery learning.

In the average difference test the mathematical literacy ability is obtained t count = 3.854 and t (0.95; 61) = 1.678. From the calculation, because t> t table so H0 is rejected. That is, the average mathematical literacy ability of students in the experiential learning model learning class based on self efficacy is more than the average mathematical literacy ability of students in discovery learning learning classes.

So if seen from the 3 stages of learning quality testing, namely the planning, implementation, and assessment stages, it can be said that good quality experiential learning learning.

Based on a summary of students 'mathematical literacy abilities with performance assessments based on self efficacy, it can be presented a comparison of students' mathematical literacy abilities and performance assessments that have characteristics of high self efficacy, moderate self efficacy and low self efficacy are shown in table 6.

Table 6. Students' Mathematics Literacy Abilities in Terms of Self-efficacy

Aspect	Self Efficacy		
	High	Moderate	Low
Mathematical Literacy Ability	Students with high self efficacy are able to master the seven components of the mathematics literacy process even though there are still two components whose completion is less than optimal	Students with self efficacy are only mastering some components of the process of mathematical literacy to the maximum	Students with low self efficacy have not mastered the components of the mathematics literacy process to the maximum
Performance	Students with high self-efficacy are able to prepare preparation, implementation and reports very well.	Students with self-efficacy are able to arrange preparation, implementation and reports well.	Students with low self-efficacy in preparing the preparation, implementation and report quite well.

Based on the table students with low self-efficacy have not mastered the components of the mathematics literacy process to the maximum. To get relevant conclusions related to the ability of mathematical literacy completed with interviews with subjects. Here is one of the results of the work of students with low self-efficacy in Figure 1.

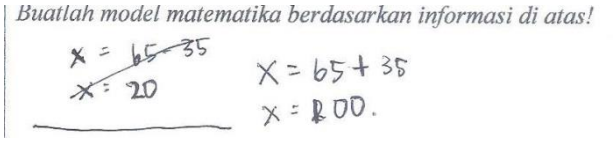

Figure 1. Student Work with Low Self-Efficacy

In Figure 1. shows that students write a mathematical model of the problem but not quite right. SKB1 students have not written the complete mathematical form but are looking for the final result. This shows that SKB1 students have not mastered the components of the mathematics literacy process in mathematising abilities. This is in line with (Lestari D. I. et al, 2020) which states that students who have low and high self-efficacy categories both have good ability in the communication component, but still lacking in other components including mathematising.

Students with high self-efficacy are able to master the seven components of the mathematics literacy process, although there are still two components that are less than optimal completion. Here is one of the results of the work of students with high self-efficacy in Figure 2.

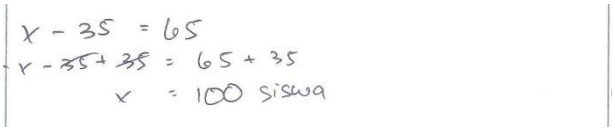

Figure 2. Student Work with High Self-Efficacy

In Figure 2. Shows the results of SKA1 student work shows that students can already write the steps of completion as a strategy to solve the problem. The completion steps are written coherently, the formula used and the calculation process are carried out correctly so that the final solution found is right. This is consistent with Nadia's (2017) research which states that high self-efficacy students have no difficulty in solving a problem by expressing abstract ideas in the form of mathematical representations. Students with high self-efficacy regard difficult assignments as a challenge (Bandura, 1993). Based on the research results of Pasandaran and Rusli (2016) also stated that students with high efficacy tend to be flexible in trying to communicate their ideas into symbolic language. Fast et al. (2010) also stated that higher levels of mathematical self-efficacy positively affect students' mathematical performance. Students with self efficacy are being able to use all indicators of mathematical

communication even though it is still less than optimal. Juhrani (2017) in his research results also said students with high self-efficacy can use all mathematical communication indicators to the maximum.

CONCLUSION

Based on the analysis and discussion previously obtained the conclusion that the quality of learning Experiential Learning models with performance assessment based on self-efficacy of quantitative mathematical literacy ability is included in both categories. This is shown from the 3 stages of learning quality testing, namely the planning, implementation, and assessment stages can be said to be good quality experiential learning learning.

Students who have low self efficacy have not mastered the components of the mathematics literacy process to the maximum, students who have moderate self efficacy are only able to master the ability to use mathematic tools and in other components of the mathematical literacy process the ability of students who have moderate self efficacy is quite good. Students who have high self-efficacy are able to master the seven components of the mathematics literacy process even though there are still two components that are less than optimal completion.

Students with high self-efficacy are able to master the seven components of the mathematics literacy process even though there are still two components that are less than optimal completion, students with self-efficacy are only mastering a few components of the mathematical literacy process to the maximum, students with low self-efficacy have not mastered the components of the literacy process mathematics to the maximum.

Students with high self-efficacy in performance assessment are able to prepare preparations, implementations and reports very well, students with self-efficacy are able to prepare preparations, implementations and reports well, students with low self-efficacy in preparing preparations, implementation and reports pretty well.

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