Mathematical Literacy Reviewed From Habits of Mind Through Schoology-Assisted REACT Strategy

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Abstract:

This study aims to analyze to (1) analyze the quality of learning through the react strategy assisted by schoology on students' mathematical literacy ability; (2) analyze students' mathematical literacy skills based on students' habits of mind. The population in this study were students of class VII MTs Nu Al-Hikmah Semarang for the 2020/2021 school year with samples of classes VII A and VII C who acted as experimental classes and control classes, respectively. The study subjects consisted of two students each with high habits of mind, habits of mind medium, habits of low mind. The method used in this study is a mixed method. The results showed that (1) REACT strategies assisted by quality schoology in improving students' mathematical literacy skills, that is, students are very capable of mastering components.

Keywords : Mathematical Literacy, Habits Of Mind, REACT Strategy, Schoology

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1. Introduction

Quality human beings are used as the main focus so that Indonesia is able to carry out development and can compete with other nations. To realize this, it is necessary to make an effort made in various aspects of life, especially in the field of education. Education is a must for mankind and lasts all life, that is, from its birth to a world where every child has the need to obtain an education. Moretti & Frandell (2013) stated that education as a means of risk prevention as well as a tool that can help improve the quality of human life in a sustainable manner. Education is able to give birth to the nation's children who are ready to compete to face the challenges that exist.

Especially in the 21st century where the learning paradigm emphasizes the ability to connect the knowledge learned with conditions in the real world, the ability to think critically, the ability to communicate and collaborate and be able to follow the development of science and technology (IPTEK). Mathematics is studied at every level of school from elementary school to higher education. Budiono & Wardono (2014) stated that "Mathematics is the science that underlies the development of modern technology. In addition, mathematics has an important role in various disciplines and advances the human mindset".

Mathematics is used as a way to shape the human mindset. Wardono, Mariani, and Candra (2015) stated that mathematics is considered to have great benefits for students to follow learning at a

higher level or to overcome problems in everyday life. Mathematics is developed in order to be able to equip students with analytical, systematic, critical, and creative abilities.

Mathematics is still one of the lessons that are considered difficult by students, as a result of which students are less interested in learning mathematics. The situation of learning mathematics is considered by students to be quite boring, making students less understanding of the concepts of mathematics itself. To understand mathematical concepts, it is necessary to have the ability to generalize and abstract well. One of the abilities that must be possessed by students in learning mathematics is mathematical literacy.

Mathematical literacy is introduced within the National Council of Teachers Mathematics or NCTM. NCTM has five competencies in mathematics learning, including: mathematical reasoning, mathematical connection, mathematical representation, mathematical communication and mathematical problem solving.

According to the OECD (2016), mathematical literacy is the ability of an individual to formulate, use and interpret mathematics in a variety of contexts which includes mathematical reasoning and the use of mathematical concepts, procedures, facts, and tools to describe explain and estimate an event. Johar (2012) argues that mathematical literacy helps individuals know the role of mathematics in the real world and can consider a good decision as a citizen.

Mathematical literacy has 7 basic abilities that must be possessed by students, namely: 1) communication, students are able to analyze information through the problems presented, can present and provide solutions; 2) mathematizing, students are able to turn the problem into mathematical modeling and interpret it into real life; 3) representation, students are able to present problems using mathematical representations; 4) reasoning and argumenting, students have the ability to reason and give logical arguments; 5) devising strategies for solving problems, students have the ability to solve problems with the strategies they have drawn up; 6) using symbolic, formal and technical language and operation, students have the ability to use symbolic, formal, and technical language and operations; 7) using mathematical tools, students are able to use mathematical tools.

Through international forums, it appears that the mathematics ability of students in Indonesia is still relatively low compared to other countries participating in the survey. It can be seen from the results of surveys conducted by international institutions such as the Program for International Student Assessment (PISA) and the Trend in International Mathematics and Science Study (TIMSS).

The PISA study is a program implemented by the Organization for Economic Cooperation and Development (OECD) since 2000 which aims to be able to see the mathematical literacy skills of students who are 15 years old. According to the OECD (2016b) states that PISA results in 2012 show indonesia ranked 64th out of 65 PISA participating countries with an average score of 375, while PISA results in 2015 showed Indonesia ranked 69th out of 76 PISA participating countries. It can be seen that Indonesia is ranked in the bottom 7 and as many as 42.5% of students are only able to solve literacy questions up to level 2 (OECD, 2016).

Trend in International Mathematics and Science Study (TIMSS) is a survey conducted by The International Association for the Evaluation and Educational Achievement (IAE) that focuses on the content and cognitive domains of students in mathematics. The content domain consists of numbers,

algebras, odds, data, and geometry, while the cognitive domain consists of knowledge, reasoning, and application. This survey started in 1999 is carried out every 4 (four) years. Murtiyasa (2015) mentioned that in 1999 Indonesia occupied the 34th position out of 48 countries, in 2003 Indonesia occupied the 35th position out of 46 countries, in 2007 Indonesia occupied the 36th position out of 49 countries, and in 2011 Indonesia occupied the 36th position out of 40 participating countries. According to Nizam (2016) stated that the results of the TIMSS survey in 2015 Indonesia occupied the 44th position out of 49 countries that participated in the survey.

Some of the following findings reinforce the results that have been presented above. Among them, according to Mahdiansyah & Rahmawati (2014) stated that the achievement of mathematical literacy of students who were sampled for their studies was still relatively low, even though the questions proposed had been adjusted to the context in Indonesia. The findings of Wijaya, Panhuizen, Doorman and Robitzsch (2014) suggest that most students still have difficulty in the early stages of completing context-based mathematics tasks, namely understanding real problems and turning them into mathematical problems. The findings of Wardono, Waluya, Kartono, Mulyono, and Mariani (2018) stated that students' mathematical literacy process ability is only to the limit of communicating problems, this happens because students are considered unable to apply basic algorithms and interpret the results of mathematical calculations in the context of the problems faced.

These results show that students in Indonesia are still experiencing difficulties in terms of learning mathematics. One of the important abilities in learning mathematics that students in this country still find difficult is the ability to learn mathematics. This problem is one of the things that must be paid more attention by all of us, especially by educators.

The process of learning mathematics does not only develop cognitive aspects, but there are also other aspects that are developed, especially those related to mathematical literacy ability, namely affective, because in the teaching and learning process teachers must also develop life values.

In the learning process in the classroom, the affective aspect is one of the important things for students to have in learning mathematics, it is supported by the application of students' habits of mind. Habits of Mind (HOM) implies that behavior requires a discipline of mind that is trained in such a way, so that it becomes a habit to always try to do more wise and intelligent actions. This can be understood because any form of action performed by an individual is a consequence of his thinking habits. According to Costa and Kallick (2012) mentioning habits is a behavior that is well demonstrated at the right time. Habituation to the regulation of thought processes is a way to open up the space of the mind as a place where thought processes take place. Students need to have good thinking habits in order to be able to respond to a problem that arises in learning. Students' thinking habits in learning become fundamental when they get a problem that must be solved. As with mathematical literacy skills, habits of mind support students' thinking power so that they do not give up easily in facing problems and are able to solve them well.

Related to problems regarding mathematical literacy in terms of students' habits of mind, preliminary research was carried out at MTs Nu Al-Hikmah Semarang. Interviews with teachers who teach class VII mathematics subjects at MTs Nu Al-Hikmah Semarang were conducted to

obtain secondary data in preliminary research. The interview results stated that there are still many students who experience difficulties when presented with problems in the form of story questions. There are still many students who find it difficult to understand the problem presented and turn the problem into mathematical modeling, especially the problem presented is in the form of a story problem. In addition to interviews with teachers, researchers also conduct interviews with students of class VII. The results of interviews with students showed that many students felt less interested in the story. According to them, the story is so convoluted with long sentences that it makes students less able to understand the problem well. This makes it difficult for students to determine problem-solving strategies and it is difficult to relate them to some of the knowledge they have to be able to solve the problems presented.

Based on the results of observations in the mathematics learning process in class VII MTs Nu Al-Hikmah Semarang, many students are not enthusiastic about dealing with story problems through the problems presented by the teacher. They are less trying to explore the mathematical ideas they have. They have not been able to utilize the knowledge they have previously possessed to make it into a new knowledge. In the learning process, there are still many students who are less active in asking questions and answering questions given by teachers about existing problems. It is through activities like this that it is able to show that students' habits of mind are still low.

The results of Malasari's research (2019) show that habits of mind have a positive influence on students' mathematical literacy ability in solving problems. Habits of mind contributed 43.5% while 56.7% were influenced by other factors not measured in this study.

In line with this research, Dwirahayu, Kustiawati, & Bidari (2018) stated that habits of mind have a positive effect on students' mathematical generalization ability with an influence of 42.5%.

The results of the studies above prove that habits of mind have an influence on students' mathematical literacy abilities. Where students who have high habits of mind will also have high mathematical literacy skills as well.

The material of the class VII mathematics subject is considered less than optimal, namely the material of one-variable linear equations (PLSV). PLSV material can be used to solve problems that occur in everyday life. The factor that causes this PLSV material to be less than optimal is in understanding the concept, it makes students confused in solving the story questions presented. Student confusion includes confusion in understanding problems in the form of story questions and student confusion in determining the steps or solving strategies that will be used or used to solve given problems.

Related to this, the teacher as the person in charge of teaching and learning activities must be able to choose learning strategies and learning media that are able to create a pleasant learning atmosphere and can motivate students in learning so that students become active in solving problems. Muzaki, et al (2018) who stated that in the teaching and learning process must have various strategies so that students can effectively and efficiently achieve their learning goals. Wardono & Kurniasih (2015) stated that one of the efforts that can be made by an educator in order to improve students' mathematical literacy skills is by innovating in mathematics learning. The innovations that arise must think about creating a collaboration between teachers and students in order to create learning

that is able to develop students' mathematical literacy skills. One of the innovations that can solve this problem is to apply a learning strategy that supports students' mathematical literacy skills.

By looking at the difficulties students experienced, researchers are challenged to find solutions that can help students overcome the difficulties they experience by applying a learning using the schoology-assisted REACT strategy.

Husna (2014) stated that the REACT strategy can train students to develop the ability to understand mathematical concepts because in learning students are required to understand a concept based on a problem given by the teacher by relating it to the initial experience and knowledge that students have. React strategy is a learning strategy that can train students to develop the ability to understand mathematical concepts where students are required to understand a concept based on the problem presented by relating it to their initial experience and knowledge.

Based on the results of research conducted by Bilgin, Yurukel, and Yigit (2017) which concluded that react strategies are more efficient for improving academic achievement and conceptual change of students. In line with this research, the results of research conducted by Pratama and William (2018) showed that students who participated in learning with the REACT strategy had higher mathematical communication skills than students who followed conventional learning.

The learning process using REACT strategies can lead students to figure out, not be informed. In addition, it is able to provide space for students to be more active during the learning process. Therefore, it is also expected that there will be a strengthening of the process of students' mathematical literacy abilities. Based on these reasons, learning using the REACT strategy needs to be carried out.

Schoology is a digital classroom development application using the Learning Management System (LMS). One of the web-shaped LMS is in the form of social media which is used for free with easy use to support learning. Schoology can be accessed via laptop or mobile phone, so it is very easy to use by teachers and students (Karminingtyas, 2019).

The results of research from Pratama, Hartini & Misbah (2019) stated that the use of schoologybased e-learning can improve students' digital literacy skills. In line with research conducted by Setiyani (2019) states that the communication skills of students who apply schoology are better than without schoology assistance. There are differences in student motivation and interest in learning before and after applying schoology media with an increase in the average score obtained by students (Nuryaningsih, 2021).

Schoology provides new experiences and situations in the learning process. Given the current pandemic conditions that require students to go to school from home, the use of schoology is very helpful for teachers and students so that the teaching and learning process runs well. Through this medium, it is hoped that students' mathematical literacy skills can improve.

Learning mathematics using the REACT strategy assisted by schoology in mathematical literacy activities trains students to get used to mathematical literacy and increases students' enthusiasm in learning mathematics. During learning, students are also trained to develop thinking habits in the process of solving problems that are given well. These efforts are carried out as a habituation step to the psychomotor and affective aspects of students.

2. Methodology

The method used in this study is quantitative. The population in this study was students of class VII MTs Nu Al-Hikmah Semarang in the even semester of the 2020/2021 academic year. The samples in this study were students of class VII A as an experimental class who were given treatment in the form of learning through the REACT strategy assisted by schoology and class VII C as a control class were given treatment in the form of learning with a problem-based learning model. Sampling is based on cluster random sampling techniques.

The data collection method in this study used questionnaires, observation sheets, tests, and documentation. Data analysis begins with analyzing the question items, preliminary data analysis which is then continued with hypothesis testing. Preliminary data analysis was carried out to find out whether the two groups of samples had the same initial ability, and it was obtained that the initial abilities of class VII A and VII C students were the same. Meanwhile, hypothesis testing includes learning due diligence which consists of individual due diligence and classical due diligence, average difference test, difference test of the proportion of student completeness, and average difference test for improving mathematical literacy ability.

Before conducting the hypothesis test, a prerequisite test is first carried out which includes a normality test using the Kolmogorov-smirnov test and a homogeneity test using a levene test with the help of SPSS 16.0.

3. Results And Discussion

Quality of Learning

The quality of learning consists of various stages, namely the stages of planning, implementation, and assessment. This planning stage is through an assessment conducted by three expert validators on a scale of 5. Validated learning tools include syllabus, lesson plan, teaching materials, student activity sheets (LKS), observation sheets for learning achievement, habits of mind questionnaires, mathematical literacy test questions and interview guidelines. Each device gets the lowest average score of 4.2 for LKS and the highest average of 4.47 for the observation sheet of learning achievement and habits of mind questionnaire which means the interpretation for each device is in the very good category so it is feasible to use. The results of the instrument trial of mathematical literacy test questions were selected 8 questions to be used as postest questions based on the results of validity, realiability, level of difficulty, differentiating power and indicators that contain students' mathematical literacy abilities.

At the implementation stage, a learning is said to be of high quality if the observation sheet by the observer and the student's response sheet to the learning are in the minimal good category. The observer who assessed was the mathematics teacher of the school where the research was held, where the implementation of the study was 4 meetings with an average score that increased in each meeting, namely 4.17 at the first meeting, 4.3 at the second meeting, 4.5 at the third meeting, and 4.67 at the fourth meeting with excellent interpretation. Meanwhile, the student response sheet to learning obtained a score of 97.3% with excellent interpretation.

The quality of the assessment stage can be seen from the effectiveness of learning with the react strategy assisted by schoology on mathematical literacy skills. According to Prabawa and Zaenuri

(2017) stated that the effectiveness of a learning is an indicator of the success of the learning carried out. Before conducting an effectiveness test, it is first necessary to conduct prerequisite tests, namely normality tests and homogeneity tests using the help of SPSS 16.0. the results of the normality test obtained that the data came from a normally distributed and homogeneous population. Based on the results of the research data obtained, an average test of mathematical literacy ability based on BTA will be carried out with the help of SPSS 16.0 and $\alpha = 5\%$. In this test, a significance value of 0.000<0.05 was obtained, then H0 was rejected. So it can be concluded that the average value of mathematical literacy ability of students using the schoology-assisted REACT strategy reached the actual completion limit (BTA) of 60.

The results of the classical due diligence are used to test whether the proportion of students who reached the actual completion limit has reached 75%, using the z test, obtained Z_hitung>Z_tabel namely 2,066>1.64 then H0 was rejected. This means that it can be concluded that the proportion of student completion using the schoology-assisted REACT strategy is more than 75%. The next test is an average difference test that is used to find out whether there are differences in student abilities in learning using the REACT strategy assisted by schoology with students' ability to learn Problem Based Learning. The test used is the Independent Sample T-Test test obtained results from the output of the Independent Samples Test contained in Table 4.6 of the Equal variance assumed section, it is seen that the value of Sig. (2-tailed)=0.001<0.05, then H0 is rejected. The conclusion is that the average student's mathematical literacy ability in problem-based learning. With an average gain in the experimental class of 79.65 while the control class of 68.25.

Furthermore, a different test was carried out on the proportion of student completeness using the z test, obtained z_hitung>z_tabel results, namely 2.65>1.64, then H0 was rejected. This means that the proportion of completion of students' mathematical literacy abilities in the classroom who use the react strategy assisted by schoology is more than the proportion of the completion of students' mathematical literacy abilities in classes that use problem-based learning models. The last test carried out was a test of the average difference in the increase in mathematical literacy ability using an n-gain test whose results can be seen in table 1.1 below.

Kriteria	Banyak Siswa	Presentase
Tinggi	2	10%
Sedang	18	85%
Rendah	1	5%

Table 1.1 Results of Improving Students' Mathematical Literacy Ability

Based on Table 4.7, it can be seen that the results of improving the mathematical literacy ability of students in classes using the schoology-assisted REACT strategy at a high level are 10%, medium 85%, and low 5%.

The classic average of normalized gains can be calculated using the help of the Statistical Product and Service Solution (SPSS) 16.0 application. The test results differed in the average increase in mathematical literacy skills in classes using the react strategy assisted by schoology was 0.47% or 47.24. Meanwhile, the average increase in mathematical literacy ability of students in classes using

problem-based learning models was 0.26% or 26.46%. Then H0 was rejected, the conclusion means that the average increase in mathematical literacy ability of students using the react strategy assisted by schoology is higher than the average increase in mathematical literacy ability of students who use problem-based learning models.

The test results above show that learning with the schoology-assisted REACT strategy can be said to be of high quality. This is because the learning syntax that familiarizes students with mathematical literacy in solving given problems and the application of this strategy aims to provide opportunities for students to explore their knowledge and develop this knowledge to solve existing problems.

4. Conclusion

Based on the results and discussion, it shows that learning with the REACT strategy assisted by schoology is declared to be of high quality to students' mathematical literacy skills. At the planning stage, the device is validated with good and excellent category achievement. At the implementation stage, the level of implementation of the learning process in general is in the good category and the student's response to the learning process in general is in the good category and the student's response to the learning process is very positive. At the assessment stage, the final results of learning are declared effective in improving students' mathematical literacy skills. The effectiveness is based on the test results which state: 1) the mathematical literacy ability of students who use the schoology-assisted REACT strategy exceeds the minimum completion criteria (KKM) limit and the proportion of student completion using the schoology-assisted REACT strategy is more than 75%; 2) students' mathematical literacy ability in learning using schoology-assisted REACT strategies is better than students' mathematical literacy ability in problem-based learning; 3) the proportion of student completion in learning using the schoology-assisted REACT strategy is better than the proportion of student completion in problem-based learning model learning; 4) the improvement of students' mathematical literacy ability in learning using the schoology-assisted REACT strategy is higher than the increase in students' mathematical literacy ability in problem-based learning model learning.

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