

Mathematical Literacy Skills of Elementary Teacher Education Students through "Mathematics in Life" Approach

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Abstract. Elementary Teacher Education students are prospective elementary school teachers who will later teach mathematics to elementary school students who are in fact realistic mathematics, so prospective teachers must also learn how its application in the mathematical concepts learned. Another demand faced by elementary school teachers and students, especially at this time is the habituation of Literacy in all aspects of content delivered in elementary schools. Mathematical literacy is needed by students in solving problems of daily life. The purposes of this study are as follows: (1) to find out how the process of implementing Mathematics in life; (2) to find out how the ability of mastering mathematics literacy and (3) to find out how students respond after attending Mathematics in life class. This study uses a qualitative approach, in which two sampling techniques are used namely convenience and snowball sampling. The conclusions of this research are: (1) The process of implementing Mathematics in runs with tremendous enthusiasm from the students; (2) The ability of mastering mathematics literacy after implementing the stages of mathematical literacy in solving everyday problems is said to be quite good; and (3) Students' responses after taking Mathematics in Life based on literacy show positive responses.

Keywords: elementary teacher, mathematics in life, mathematical literacy, realistic mathematics

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INTRODUCTION ~ Along with curriculum changes that sometimes have an impact on the learning process and the assessment process, teachers are required to always be able to keep up with the times and not be trapped by past styles that still prioritize results not processes. One of the ends of the learning process in schools is the National Assessment, which consists of a Minimum Competency Assessment, a Character Survey and a Learning Environment Survey. The Minimum Competency Assessment is designed to measure student achievement from cognitive learning outcomes, namely literacy and numeracy. These two aspects of minimum competence are a requirement for students to contribute to society, regardless of the field of work and career

they want to pursue in the future. "Focusing on literacy and numeracy skills does not reduce the importance of the subject. Because it helps students study other fields of science, especially to think and digest information in written form and in numbers or quantitatively," explained the Minister of Education and Culture. The questions contained in the Minimum Competency Assessment are multiple choice questions and entries, but many people think that multiple choice questions are questions that only put forward the final result regardless of the process. However, for a teacher, it is obligatory to make this a challenge on how to keep students recorded in the process of solving questions and not just seeing the results. This is because the implementation of this assessment is not

only carried out at the elementary level, but still continues to the junior high school and even high school levels (Kebudayaan, 2020; Nehru, 2019).

Based on the Standard Operational Procedure on National Examinations and based on experience in 2018-2019 that at the junior high school and senior high school levels a Computer-Based National Examination has been carried out, where the questions contained, especially mathematics, are questions of High Order Thinking Skills (HOTS) (Badan Standar Nasional Pendidikan, 2019). As expressed by Bambang Suryadi as Chairman of the National Education Standards Agency which states that: "Our children will not be competitive if they are not trained in 21st century life skills, for example making comparisons, analyzing data, thinking critically, making conclusions, solving problems and applying their knowledge to the world context. real as well as in new situations ". So, the ability to be able to solve problems, especially mathematics, needs to be taught as early as possible (BNSP, 2018).

Elementary Teacher Education students are prospective elementary school teachers who will teach mathematics to elementary school students. Mathematics taught to elementary students is realistic mathematics or related to daily activities, so that prospective teachers must also learn how mathematics is in life and its application in the mathematical concepts being learned. Involving daily problems in the context of mathematics is one way for teachers to be able to see the problem solving process carried out by students and not only see the results but the process from the beginning to understand until the problem is resolved. Abstract mathematics will disappear when the

teacher can involve daily activities from mathematics, so that students will feel mathematics is a fun subject and very useful in solving daily problems (Saxena, Shrivastava, & Bhardwaj, 2016; Schoenfeld, 1992).

Another demand faced by elementary school teachers and students especially at this time is literacy habituation in all aspects of the content delivered in elementary schools. Literacy is often associated with the content of Indonesian, because in literacy there are processes of listening, speaking, reading and writing (Mayer, 2007). However, basically literacy skills can also be developed into content or other subjects in Elementary Schools. Some of the current conditions, in the process of learning mathematics, most of them only prioritize the computation process or just counting, so that there are many problems that a student has difficulty solving math story problems. This is because the literacy skills possessed are still not honed. In PISA 2012, mathematical literacy is defined as the individual's ability to formulate, use and interpret mathematics in various contexts (Mulyono & Lestari, 2016; PISA 2015 Mathematics Framework, 2017). Mathematical literacy is needed by students in solving problems of everyday life. A student can be said to be able to solve problems if he is able to analyze a problem and is able to use his ability in new situations, and this ability is called HOTS (Tambunan, 2019).

The mathematics literacy of Indonesian students is very low. One of the reasons stated was because the mathematics education curriculum in Indonesia had not emphasized problem solving, but rather on procedural matters. Students are trained to memorize formulas, but do

not master their application in solving a problem (Fenanlampir, Batlolona, & Imelda, 2019; Stacey, 2011). In addition, in a national mathematics seminar, the problem-solving ability of students in Indonesia is still lacking, even though problem solving is very important because it can be used or applied in everyday life (Kesumawati, 2009). Research that discusses the mathematics literacy abilities of elementary school students found that mathematical literacy at solving story problems is still low, due to the low reading, writing and numerical abilities, as well as the less supportive roles of teachers and schools in learning mathematics literacy (Simarmata, Wedyawati, & Hutagaol, 2020). On the other hand, the role of the teacher is very much needed in learning mathematics literacy. One of the efforts to maximize the role of teachers is the careful preparation of prospective teachers which incidentally is a elementary teacher education students. One study that also discusses the literacy elementary teacher education students shows that not all students meet all mathematical literacy indicators that exist in the problem, namely understanding the problem and formulating it mathematically; compile a settlement strategy and implement it; interpret the answers in mathematical form into the context of the problem properly. So, so that students can also have good mathematical literacy skills, the main thing that must be addressed is the prospective teacher. It's good, a prospective teacher is also equipped with good mathematical literacy skills to pass on to their students later (Hidayati, Wulandari, Maulyda, Erfan, & Rosyidah, 2020).

One of the courses in the Elementary Teacher Education is Learning Numbers and Data Processing, which in this course contains how to teach numbers and data processing material to elementary students. To minimize the provision of material that only puts forward the results, it must be correct without paying attention to the process, so as a lecturer who teaches this subject, he must have a way of how the material presented to students becomes material that has meaning, sees the process and can develop mathematical literacy which later can also implemented in learning in the field or in Elementary School.

Based on the background that has been presented, the researcher intends to apply mathematical concepts in literacy-based life in the Number Learning and Data Processing courses, to examine how the process is and the student's response after carrying out the learning. And this will be studied in a research entitled *Mathematical Literacy Skills of Elementary Teacher Education Students Through "Mathematics in Life" Approach*.

METHOD

This study used a qualitative approach, in which two sampling techniques were used, namely convenience and snowball. Convenience sampling is a sampling technique with considerations of convenience, in selecting samples, researchers have no other considerations except based on convenience alone (Landers & Behrend, 2015). However, if you feel that the data collected is incomplete, the sampling technique will be carried out by means of a snowball, namely with the help of references, the researcher will look for other parties related to the research focus (Handcock &

Gile, 2011). The sample taken will continue to grow from one party to another until the data obtained is complete and in-depth. The problem examined in this study is how the process of learning mathematics in the subject of learning numbers and data processing that involves mathematics in literacy-based life. This research is a qualitative descriptive study that describes the conditions and facts in the field during the research process which are explained by means of words or descriptive (Callon, Courtial, & Laville, 1991).

The research conducted in the Department of Elementary Teacher Education, State University of Surabaya. The research sample was students

majoring in Elementary Teacher Education, Universitas Negeri Surabaya, class of 2020 – Odd Semester 2021/2022 in Nunber and Data Processing Course. Data collection carried out in this study using the following methods: (1) observation; (2) scoring rubric and (3) questionnaire. In this study, researchers used qualitative data analysis to find out data and facts about learning involving mathematics in literacy-based life. The analysis will be carried out continuously until it is complete in order to produce in-depth data. The activities in analyzing data are as follows: (1) data collection; (2) data condensation; (3) data display and (4) conclusion: drawing or veifying (Matthew B. Miles, A. Michael Huberman, 2014)

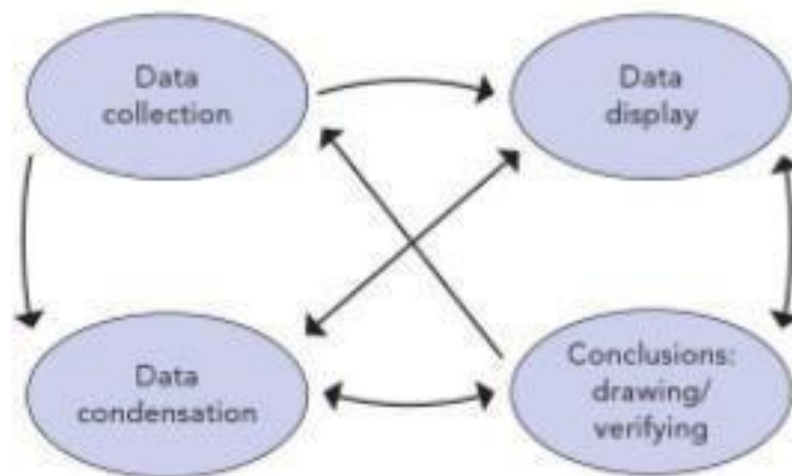


Figure 1. Components of Data Analysis: Interactive Model (Matthew B. Miles, A. Michael Huberman, 2014)

RESULTS

The research was carried out in the Odd Semester 2020/2021. The initial activities began exploring students' initial mathematical literacy skills by being given several mathematical word problem that had to be solved, however of all students, only 10 students were able to

solve the problems well, the rest were still confused in understanding the questions and arranging their solutions, this was evident in the observation sheets that the observer used to observe student activities with the steps in solving the problem. It can be seen that some students still feel confused in

understanding the questions and try to express them using their own language. Some students seem to have understood the problem, but still have doubts in preparing a problem-solving plan.

Next, the researcher asked some spontaneous questions to explore the answers to why some students had difficulty solving these problems. It turns out that from several students' answers, it turns out that literacy skills which consist of: gathering information, processing information and communicating the information back are still considered low. They could not understand what the question of the story meant, some even said that "why not just numbers, why should there be a story?". Then the researcher gave some reinforcement related to HOTS questions which required students to think critically to be able to solve problems, and not just do math problems which consisted of numbers. The next activity was carried out at the next meeting, researchers gave a daily problem that is very close to their lives, namely the implementation of a farewell event at elementary school. Researchers divided students into several groups and gave a student worksheet containing a problem that required them to use literacy skills, especially mathematical literacy in solving it. Starting from understanding the problem by collecting information, then processing the information and arranging it in several problem solving plans, then the plans that have been compiled are processed into mathematical language to make it easier to solve them. After completing it, students are asked to communicate the results by presenting them to the class.

In contrast to the initial activity when the researcher gave story questions and some

students were unable to solve it, but this time by working with groups, students worked coherently in understanding the problem, this can be seen in the observation sheet used by the observer to observe student activities related to the steps in problem solving, starting from collecting any information contained in the problem, then processing the information and ending with communicating what has been obtained with the group. From the observations, some students who initially could not understand the questions in the form of stories, this time seemed eager to solve problems.

To be able to recheck students' literacy skills, researchers asked students to return with their groups to be able to make mathematical problems, which involve activities in everyday life. After the problems have been made, they exchange problems between groups so that other groups can work on them. In this activity, several unique things emerged, one of which was that there was one group, namely group A, had difficulty working on the problem, this was because the problems made by group C could not be understood, but after being explained verbally, group A understood and can continue to solve the problem. From the observations that occurred between groups A and C, it turns out that what a person means can change meaning when it is written in writing, so the habit of reading and expressing what he wants to convey really needs to be used.

After the students worked on and finished the story problems designed by other groups, the researcher tried to check the students' mathematical literacy skills by using a student assessment rubric that had been adjusted to the stages of literacy

combined with Polya's problem solving stages. Based on the results of the assessment using an assessment rubric,

the mathematics literacy abilities of the students can be stated in table 1 as follow:

Table 1. Student assessment results

| No. | Name | Mathematical Literacy Stage | | | | Score |
|-----|------|-----------------------------|----|-----|----|-------|
| | | I | II | III | IV | |
| 1. | AS | 4 | 4 | 4 | 4 | 100 |
| 2. | APS | 3 | 3 | 3 | 4 | 81.25 |
| 3. | WM | 3 | 4 | 4 | 4 | 93.75 |
| 4. | APH | 4 | 4 | 4 | 4 | 100 |
| 5. | HAPW | 4 | 3 | 4 | 4 | 93.75 |
| 6. | ADF | 3 | 3 | 3 | 3 | 75 |
| 7. | SAJ | 3 | 3 | 4 | 4 | 87.5 |
| 8. | LMZ | 3 | 4 | 4 | 4 | 93.75 |
| 9. | AN | 4 | 4 | 4 | 4 | 100 |
| 10. | AA | 4 | 3 | 3 | 3 | 81.25 |
| 11. | INA | 4 | 4 | 4 | 4 | 100 |
| 12. | AARD | 3 | 3 | 3 | 3 | 75 |
| 13. | ARH | 3 | 3 | 4 | 4 | 87.5 |
| 14. | EPAA | 3 | 4 | 4 | 4 | 93.75 |
| 15. | SMD | 4 | 4 | 4 | 3 | 93.75 |
| 16. | SSKD | 4 | 4 | 4 | 3 | 93.75 |
| 17. | AW | 3 | 3 | 3 | 4 | 81.25 |
| 18. | DAM | 3 | 4 | 4 | 4 | 93.75 |
| 19. | NAR | 4 | 4 | 4 | 4 | 100 |
| 20. | DGR | 4 | 4 | 4 | 4 | 100 |
| 21. | ASD | 4 | 4 | 4 | 4 | 100 |
| 22. | AWK | 4 | 4 | 4 | 4 | 100 |
| 23. | SDF | 4 | 4 | 4 | 4 | 100 |

This stage of understanding the problem, which is actually the first stage in mathematical literacy, makes students think a little more critically in solving problems, and not just looking at the numbers in the problem, but also understanding the meaning of these numbers.

Some students said that there were a few shortcomings in the learning steps carried out by the researcher, namely the process of each stage was carried out with a monotonous rhythm. Students are invited to understand the problem in groups, then discuss what plans will be

implemented in solving the problem, then continue in groups to implement the problem and end with a presentation. In the interviews conducted with students, there are suggestions given, namely, the implementation of the four stages of mathematical literacy that can be carried out more interestingly, for example with games or adventures that can attract students' interest in solving problems.

DISCUSSION

According to the results of the research that has been described, the process of implementing Mathematics in Life is based on literacy in the Number Learning

and Data Processing course at Elementary Teacher Education running with extraordinary enthusiasm from Elementary Teacher Education students. Initially students did not know that there was the term mathematical literacy, which students only understood to solve math problems whose contents were only numbers. However, along with the development of science today, there are a lot of HOTS-based and Literacy-based questions, so the literacy-based learning process of Mathematics in Life can really help students solve math problems. This is in line with Kenedi's thought (Kenedi, 2018), which states that the main component in mathematical literacy is to facilitate daily problem solving while at the same time developing mathematical skills. Problem-based learning is a learning model that presents contextual problems that can stimulate the creativity of students to find concepts and solve problems in everyday life (Savery & Duffy, 1995; Siagian, Saragih, & Sinaga, 2019).

Based on the results of the assessment using a rubric to measure the mastery of mathematical literacy of the students, it shows that after implementing the stages of mathematical literacy in solving daily problems, students' mathematical literacy skills are said to be quite good, this is supported by the results of the assessment of 9 out of 23 students getting grades perfect. This agrees with (Dinni, 2018) who said that with high order thinking that is integrated into everyday problems. Students will be able to clearly distinguish ideas or ideas, argue well, be able to solve problems, be able to construct explanations, be able to hypothesize and understand things. complex becomes clearer (Hmelo-Silver, 2004; Paul, 1990).

From the results of the questionnaires that have been distributed to students, it can be shown a positive response, students find it easy to solve math problems when using or implementing literacy steps or stages combined with Polya's problem solving stages. This is supported by Najwa's opinion (Najwa, 2018) which states that mathematical literacy must be supported by an appropriate learning approach, so that the literacy experience can be felt by students. One of the lessons that support mathematical literacy is a realistic mathematics approach (Kuswidyarko, 2017).

Realistic mathematics approach or in Indonesian we called it Pendidikan Matematika Realistik Indonesia (PMRI) as an approach adapted from Realistic Mathematics Education (RME) can have a positive impact on students' literacy skills in problem solving. In the process of learning mathematics in literacy-based life, it raises mathematical problems that involve everyday life and is solved by students using mathematical literacy stages, so that students find it easy to solve them (Han & goleman, daniel; boyatzis, Richard; Mckee, 2019; Jurdak, 2016).

CONCLUSION

In accordance with the formulation of the problem and based on the results and discussion of this research, conclusions can be drawn: ((1) The process of implementing Mathematics in life runs with tremendous enthusiasm from the students; (2) The ability of mastering mathematics literacy of Elementary Teacher Education students after implementing the stages of mathematical literacy in solving everyday problems, the

mathematical literacy ability of students is said to be quite good, this is supported by the results of an assessment of 9 of 23 students getting perfect grades; and (3) Students' responses after taking Mathematics in Life based on literacy show positive responses., students find it easy to solve math problems when using or implementing literacy steps or stages combined with Polya's problem solving stages.

Some of the suggestions in this study are as follows: (1) It is recommended for further researchers to follow up on suggestions from research subjects from this study which convey that the process of implementing the mathematical literacy stage can be made more interesting, for example, the steps for learning mathematics-based literacy can be developed by game; (2) It is recommended for further researchers to be able to implement mathematical literacy in elementary schools specifically in the realm of geometry and measurement and (3) It is recommended for future researchers to be able to implement literacy into several fields of science, especially in elementary schools, such as scientific literacy or cultural literacy and citizenship.

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