Numeracy of prospective elementary school teachers: a case study

V Yustitia¹², T Y E Siswono¹ and Abadi¹

¹ Departement Mathematics Education, Postgraduate Program of Universitas Negeri Surabaya, Indonesia
² Universitas PGRI Adi Buana, Surabaya, Indonesia

*Corresponding author: via.18010@mhs.unesa.ac.id

Abstract. Numeracy is the ability to access, use, interpret and communicate information and mathematical ideas related to numbers in a particular context. Therefore numeracy skills are needed for a prospective elementary school teacher. The purpose of this research is to describes prospective elementary school teachers’ numeracy. This type of research is a qualitative descriptive study. This study's subjects were prospective elementary school teachers’ from Universitas PGRI Adi Buana Surabaya, represented by one individual with low mathematical ability. Data were obtained through numeracy tasks. Prospective elementary school teachers with high ability can identify, find or access some mathematical information relevant to the purpose, involve using known mathematical procedures and rules, and develop opinions about that information. However, there are some errors in communicating according to the content based on its interpretation results. Prospective elementary school teachers with low ability have been able to identify, find or access some mathematical information relevant to the goal. Still, they have not been able to involve procedures and develop opinions about the information. Based on this study's results, arithmetic needs to be a topic of attention to improve mathematics learning achievement in the future.

1. Introduction

The mathematical skill that should be developed in the 21st century is numeracy. Numeracy is the ability to access, use, interpret, and communicate information and mathematical ideas related to numbers in a particular context. Therefore numeracy skills are needed for a prospective elementary school teacher. Numeration is a person’s ability to manage data and numbers to evaluate statements based on a specific context [1]. Numeracy is not only developing basic mathematical skills about numbers but is part of mathematical literacy. It can be a broad ability such as measuring; implementing, and interpreting information; understand and use the form, design, location, and direction; and think critically about quantitative information and mathematics [2].

Numeracy plays a vital role in developing the self-capacity of elementary school students in understanding mathematics's role related to numbers to solve everyday problems [3]. The importance of numeration is examined in the following examples. For example, suppose a second-grade elementary school student learns the concept of integer multiplication. Three times two, the result is six. The product is the same even though the problem is replaced by two times three. However, the meaning will be different when given in the problem of taking medication rules. The three-by-two-by-three-drug rule
can have different effects. Students who master the concept and have good numeracy will explain the reasons for the different absorption effects of drugs.

Researchers have conducted preliminary research with a qualitative study on students at SDN Kebondalem Mojosari in November 2019. The purpose of this study is to describe how elementary school students’ numeracy is. The researcher gave a test in non-routine questions adapted from PISA, consisting of 5 description questions. The content used is the quantity, and the context is personal and social. After being given the test, an in-depth interview was conducted. The results showed that (1) students had difficulty in formulating and using information about numbers to solve mathematical problems in context; (2) students have difficulty analyzing various information presented in the form of frequency distribution tables, diagrams and graphs; (3) students have not been able to interpret the results of their analysis related to numeracy problems to predict and make decisions.

Teacher quality is one of the aspects highlighted in the PISA study to explain student learning achievement. A teacher can be said as a learning agent must have an active role in building a student’s positive perception of mathematics learning so that it can support the increase of student numeracy [3]. If all teachers are able to identify and take advantage of numeracy learning opportunities in the subjects they teach, then student numeracy along with learning in each subject tends to increase [4]. Therefore, prospective teachers need to have good numeracy supplies to create a generation of gold with good numeracy as well [5].

The numeracy of 34 fourth grade students in a school in Bandung City in solving unstructured problems was unsatisfactory, they had difficulty building a solution strategy [6]. Descriptive research conducted on 60 prospective teachers at Majalengka University shows that high-ability teacher candidates can solve numeracy problems. Still, medium and low-ability teacher candidates have not shown good achievement [7]. The case study by Callingham et al. States that teachers in remote areas of Tasmania do not recognize the complexity of numeracy, but they argue that numeracy is urgent [8]. There are not enough reports on the Numeracy of Prospective Elementary School Teachers’. The focus of this study was on the process of Numeracy of Prospective Elementary School Teachers’.

2. Methods
This type of research is descriptive qualitative. This research subjects students who have common mathematical knowledge at PGSD, Universitas PGRI Adi Buana Surabaya. Implementation of the initial test to categorize students’ mathematical abilities was followed by class 2019. The test is carried out independently to get relevant results supervised by researchers. After completing the test, results are collected and corrected, resulting in 3 levels with the low, medium, and high categories.

The students are classified at each level 1 sample is taken in common mathematical knowledge. After the subject is obtained and before use As a subject for assessing the subject’s mathematical literacy abilities, activities and behavior will be seen during learning in class and outside the classroom and with the results of interviews with lecturers subjects, so that the results of sampling can be justified.

| Interval | Category |
|----------|----------|
| < 40     | High     |
| 41-70    | Moderate |
| >70      | Low      |

The instruments used in this study were written tests and interviews. Instrument the first is the instrument in the form of a mathematical knowledgeability test to obtain The classification of students’ mathematical abilities is the level of students’ mathematical abilities. The second instrument is the instrument 2, 3, namely the student numeracy test to measure student numeracy profile after students have been grouped and classified in the category of each student’s level of math ability. Interview guide instrument, that is, an instrument used to help dig up information about students’ numeracy profiles and find out what factors influence numeracy. The validity of the data using time triangulation.
3. Result and Discussion

The results obtained regarding the numeracy profile of elementary school teacher candidates carried out at PGSD, PGRI Adi Buana University Surabaya were carried out on selected subjects who were representatives of the low mathematical ability category.

The results of the analysis on the answers to numeracy questions 1 and 2 carried out by SR subjects show that the profile of the mathematics literacy skills possessed by Low (S1) subjects is still at level 1 ability in mathematical literacy, from the results of the answer analysis done by S1 can be seen in the results image S1 job on question number 1 (Figure 1).

![Figure 1. The results image S1 job on question number 1.](image)

The results were done by S1 subjects in written form on work number 1 on numeracy questions 1 and 2 have fulfilled what was desired. Students can use their knowledge to solve routine questions and be able to solve problems with general contexts. In this case, the actions that S1 has taken are identifying information and completing routine procedures according to direct instructions in explicit situations, writing down the field sizes illustrated in question number 1, numeracy questions 1 or 2. Second, they can take action easily according to the stimulus given. The stimulus or command in question number 1 is to determine the size of the path that Eko took. Here the S1 subject has properly added the circumference plus the length multiplied by two with the correct result.

![Figure 2. The S1 subject has properly added the circumference plus the length multiplied by two with the correct result](image)

The results obtained from the written test by the S1 subject have answered question number 2 on numeracy questions 1 and 2. Students can work effectively with implied models in concrete but complex situations where there are obstacles or make assumptions from the answers given by the S1 subject provided in writing. During the interview process, they have provided the results of assumptions or estimates about the results obtained. Still, in this case, for the following indicator, students can use good
skill development and express reasons and flexible views following the context of the S1 subject cannot fulfill it. It cannot show the origin of getting the results and assumptions in solving problem number 2.

Prospective elementary school teachers with low ability can identify, find or access some mathematical information relevant to the purpose, involve the use of known mathematical procedures and rules, and develop opinions about that information. However, there are some errors in communicating according to the content based on its interpretation [9]. Prospective elementary school teachers with low ability have been able to identify, find, or access some mathematical information relevant to the goal. Still, they have not been able to involve procedures and develop opinions about the information [10]. This is in line with the study results that students with low abilities will find it challenging to do high-order thinking-oriented questions [11-15].

4. Conclusion
Prospective elementary school teachers with low ability can identify, find or access some mathematical information relevant to the purpose, involve the use of known mathematical procedures and rules, and develop opinions about that information. However, there are some errors in communicating according to the content based on its interpretation results. Prospective elementary school teachers with low ability have been able to identify, find or access some mathematical information relevant to the goal. Still, they have not been able to involve procedures and develop opinions about the information.

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