KnE Social Sciences
ICMScE
International Conference On Mathematics And Science Education
Volume 2024

Research Article

Remeasuring Numeracy Literacy Skills: How Is the Students' Skills Post Pandemic?

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Abstract.
Numeracy literacy refers to an individual's ability to apply knowledge, methods, facts, and mathematical tools in everyday life. Recognizing the significance of numeracy literacy in daily life emphasizes the need for students to acquire these skills from an early age. The objective of this study is to delineate the numeracy literacy profile of students in Madrasah Ibtidaiyah (Islamic-based elementary schools) after the covid-19 pandemic, specifically in numerical concepts. The study employed a qualitative approach with a phenomenological method. Data were collected through tests, interviews, and document analysis. The data underwent processing using Milles and Huberman analysis techniques, including data reduction, data display, and conclusion/verification. The research participants consisted of 132 of fourth grade students at Madrasah Ibtidaiyah, Bandung. Traditionally, students' numeracy literacy skills are classified as basic. Students possess fundamental computational math skills, demonstrated by their ability to solve direct equations. They exhibit proficiency in understanding fractions, identifying the position of fractions on a number line, comparing two fractions, performing addition and subtraction of two whole numbers, and determining the Lowest Common Multiple (LCM) quite well. Therefore, in an effort to enhance students' numeracy literacy skill, students require tutoring through learning strategies tailored to post-pandemic covid-19 conditions, considering their initial abilities.

Keywords: numeracy literacy skills, post pandemic, students' skills.

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Published: 26 April 2024

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICMScE Conference Committee.

1. INTRODUCTION

The minimum competency assessment is one of the independent learning policy programs as a form of national assessment in place of the national exams [1]. The assessment and learning centre team clarified that the students needed the Minimum Competency Assessment to assess the essential competencies to develop their capacities and be able to participate positively in society [1]. Wahyuningsih simplified that this new paradigm in minimum competency assessment aimed to improve the education evaluation system and student learning outcomes and quality. The minimum competency assessment measured two essential competencies: reading and numeracy literacy.

The competencies assessed were logical-mathematical thinking skills, reasoning skills using concepts and knowledge learned, and skills in selecting and processing information [1]. The skills of an individual to use knowledge, methods, facts, and mathematical tools in everyday life is called numerical literacy [2]. Logical-mathematical thinking skills and reasoning were one of the skills in numeracy literacy. Ekowati et al. enlightened that one of the numeracy literacy skills was reasoning in everyday life [3]. Numeracy literacy skills were closely related to skills often encountered and needed in daily life, such as building a house, planning vacation schedules, shopping, and building a business [4]. The Department of Education and Skills added that numeracy literacy has many scopes, including problem-solving in everyday life [5]. The conclusion is that numeracy literacy was oriented toward applying mathematical concepts to problem-solving in everyday life.

Numeracy literacy is crucial to students because it is connected to their everyday lives. In addition to readiness to face life's problems, it was also a form of the progress of human civilization in solving problems in everyday life that could not be separated from the existence of mathematical concepts. Early education in reading and mathematics or numeracy literacy significantly impacted children's long-term academic and career success [6]. The Ministry of Education and Culture revealed that numeracy literacy played an essential role in making a real contribution to the growth of the economic, social, and welfare sectors for both individuals and society [7]. It also encouraged awareness that numeracy literacy was a matter of mathematics and an intersecting element of life [7].

Because of the importance of numeracy literacy for students, several numeracy literacy competencies should be taught to students from the early stage. The teachers taught formal numeracy knowledge to the elementary school-age students, namely learning mathematical concepts and skills with formal instructions in written numerical notation such as algorithms using numbers, place value assignments, knowledge of basic mathematical systems, and decimal knowledge [6]. The Ministry of Education and Culture divided numeracy literacy into several scopes, namely: 1) numbers, 2) numbers and algebra, 3) geometry and measurement, and 4) data processing [7].

In every grade level in elementary school, there are always numbers theories. Numbers were symbols used to express quantities, calculate, compare, measure, and transfer data [8]. Numbers taught in elementary schools were rational numbers, which were divided into several types, namely: 1) integers (negative integers, positive integers, and whole numbers); 2) fractional numbers; and 3) decimal numbers [9]. For fourth-grade students, numbers were marked by learning fractions, understanding equivalent

fractions using a number line, comparing two fractions, adding and subtracting two whole numbers, and determining the Lowest Common Multiple (LCM) and Highest Common Factor (HCF). Each topic that was learned would be adjusted to the level of the students. In fourth-grade class, the numeracy literacy level was at level two. Level two could be seen from learning that could make students interpret, recognize, and conclude literally [10]. At level two, students could get information from one source with a single representation method and were able to use basic algorithms, formulas, and problem-solving procedures on integers [10].

Various factors influenced the success of numeracy literacy. The Ministry of Education and Culture clarified that these factors were: 1) school outcomes, which consist of the number of mathematics and non-mathematical teacher training, the number of topic-based learning and mathematics-based learning, the number of non-mathematical learning involving elements of numeracy literacy, math scores students, and the value of mathematics in PISA/TIMSS/INA; 2) school culture base, which consists of the number and variety of numeracy literacy books, lending of numeracy literacy books, number of informative presentations in the form of numeration presentations, access to online sites related to numeracy literacy, number of numeracy literacy month activities, allocation of funds for numeracy literacy, the existence of a school literacy team, and the existence of a school policy regarding numeracy literacy; and 3) community-based, which consists of many public spaces in the school environment for numeracy literacy [7]. The number of parental involvements in the school literacy team and the number of sharing sessions by the public regarding numeracy literacy.

However, numeracy literacy could be achieved with good support from students, schools, education offices, and the community. At the end of 2019, education worldwide underwent drastic changes due to the Sars Covid-19 virus pandemic. This virus spread rapidly through tiny droplets and could spread through the air. Thus, each individual should limit gathering activities, including face-to-face learning activities. The learning process was very struggling during the pandemic. However, the government decided to hold online or online the learning process. Teachers and students applied online learning using technology and software tools that supported the teaching-learning process. Online or virtual learning could be applied using supporting software or applications [11]. However, not all students participated in learning as face-to-face learning. In the long term, the pandemic's constraints on education could cause some severe problems. The pandemic could cause several problems: losing interest in learning, job loss, study extension, limited learning facilities, limited learning opportunities, and

limited educational opportunities. Moreover, there were obstacles to carrying out the research [12].

Online learning caused several positive and negative impacts. Online learning positively impacted changing new educational paradigms, technological advances, and digitalization in educational development. The Organisation for Economic Co-operation and Development explained that learning during a pandemic encouraged accessible educational technology, adapted delivery according to age and capacity, and encouraged teacher collaboration opportunities [13]. Conversely, some teachers were struggling with online learning. During the transition from learning to online learning, some teachers did not have time to prepare themselves and had different computer mastery abilities [14].

Learning outcomes also showed the difference between in-person learning and online learning. Students who studied online got worse results than students who studied in person for exams . It all happened because students who studied online only took a little time to learn [15]. Thus, the students could not manage time and felt disturbed and frustrated with the activities assigned by the teacher [16].

The results of this study showed un-ideal results. Based on the 2022 public education report card, student learning outcomes on numeracy literacy at the elementary school level were below the minimum competency, or only <50% of students achieved the minimum competency [17]. This figure was supported by 150 fourth grade elementary school students in the initial study, which showed that mastery of numeracy literacy was at the elementary level. Based on these problems, the researcher intended to analyze the numeracy literacy skills of Madrasah Ibtidaiyah students after the Covid-19 pandemic. This study described the numeracy literacy profile of Madrasah Ibtidaiyah students after the Covid-19 pandemic in number coverage.

2. RESEARCH METHOD

The study used a qualitative approach with phenomenological methods. In this study, the researcher wanted to describe the phenomenon of the numeracy literacy skills of Madrasah Ibtidaiyah students after the covid-19 pandemic. Participants in this study consisted of 132 students at 4th grade of madrasah ibtidaiyah (Islamic-based elementary school) in Bandung City, Indonesia. The data collection was done through tests, interviews, and document analysis. The test was made according to the aspect of numeracy literacy skills for level 2 (grades 3 and 4 of elementary school/madrasah ibtidaiyah) on the material of numbers. Interviews were conducted with teachers and

students to confirm and strengthen the results of the tests given. Furthermore, the researchers observed and recorded the phenomena studied through documents in student learning outcomes, student notes, and learning supporting documents. The data was processed using Miles and Huberman analysis techniques, namely data reduction, data display, and conclusion/verification. The validity of this study used triangulation. Triangulation referred to gathering as much information from various sources through various methods [18]. This study used triangulation of data types obtained from tests, interviews, and document analysis. Researchers also obtained data from various sources, namely classroom teachers and students at the research site.

3. RESULT AND DISCUSSION

This study examined numeracy literacy skills based on initial and post-covid-19 students' skills. The initial students' skills scores were obtained when the pandemic case was high, so the online learning processes were carried out. Meanwhile, the post-pandemic scores obtained when face-to-face learning was applied were limited. The results of the students' scores after being converted were.

TABLE 1: Students' literacy numeracy skills (0 – 100 scale).

Data	Initial Skills Score	Post Pandemic Score
N	132	132
Average	56.2	67.61
Maximum	100	100
Minimum	10	25

Based on Table 1, the average post-pandemic student's numeracy literacy skills was 67.61 in a basic category. The students' numeracy literacy results had increased when the pandemic Covid-19 was still high at 56.20. The learning process after the pandemic declined was through limited face-to-face meetings. The teacher divided the students into two groups. The first group followed the lesson in the morning. Thus, the second group followed the lesson in the afternoon. The teacher sought to improve the quality of learning indicated by a supportive classroom atmosphere and adequate support and cognitive activation from the teacher even though the teaching-learning processes were reduced. Students and teachers carried out the learning process by complying with health protocols. This learning process was undoubtedly more effective when compared to online learning. At the time, online learning was still being implemented.

The media used was only through WhatsApp groups, so learning interactions were only one-way.

Table 2: Students literacy numeracy skills based on aspect (0 – 4 scale).

No.	Aspect	Average	Category
1	Understanding fraction	3.23	Intermediate
2	Knowing the position of the fraction on the number line	2.74	Basic
3	Comparing two fractions	2.15	Basic
4	Calculating the results of adding and subtracting two whole numbers	3.15	Intermediate
5	Determine the LCM of two numbers	2.25	Basic

Table 2 showed the students' numeracy literacy skills on number material in terms of the aspects. In the aspect of understanding fractions, the average student score of 3.23 was in the intermediate category. In this aspect, students were asked to represent mixed fractions in the form of pictures. Figure 1 below is an example of student answers in answering question number 1.

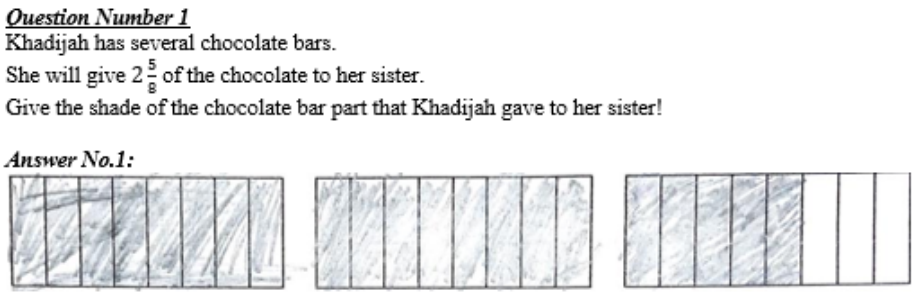

Figure 1: Student answers on the first problem

The second aspect knew the position of the fraction on the number line. Students were asked to sort three fractions and represent them on a number line. An average score of 2.74 was obtained in the basic category. Figure 2 below is an example of student answers in answering question number 2

In the third aspect, namely comparing two fractions, students were given story questions, and then there were four statements related to the problem. Students were asked to determine which statements were factual and give reasons. Table 2 showed that the average score of students in the third aspect was 2.15 in the basic category. Figure 3 below is an example of student answers in answering question number 3.

The fourth aspect was calculating the results of reducing whole numbers to get an average score of 3.15 in the intermediate category. Figure 4 below is an example of student answers in answering question number 4.

Question Number 2
The distance from Azka's house to school is 5/6 km.
The distance from Baihaqi's house to the school is 1/3 km.
The distance from Camelia's house to the school is three times the distance from Baihaqi's house to the school.
a. How long in km is Camelia's house to school?
b. Sort the distance from Azka, Baihaqi, and Camelia's house to school from closest to furthest! (For convenience, you can use a number line)

Answer no. 2
The distance from Camelia's house $= \frac{2}{6} \times 3 = \frac{6}{6} = 1$ km.
Baihaqi's house, Azka's house, Camelia's house
$\frac{2}{6}$ km $\frac{5}{6}$ km 1 km

Figure 2: Student answers on the second problem.

Question Number 3
Rahma got 3/4 of the cake and Sarah got 5/8 of the cake of the same size.
Pay attention to the following statement!
(1) Rahma got more cake.
(2) Sarah got more cake.
(3) Rahma and Sarah get the same cake.
(4) Sarah got less cake.
from the four statements above, which one is true? Explain why!

Answer no. 3:


The correct statements are numbers 1 and 4.
Because Rahma got 3 pieces of cake from the cake which was cut into 4 parts. Sarah gets 5 pieces of cake from the cake which is cut into 8 pieces. Rahma got more cake and Sarah got less cake.

Figure 3: Student answers on the third problem.

Question Number 4
The magazines are lighter 280 grams than newspapers.
The weight of the newspaper is as shown in the picture besides.
How much does the magazine weigh?

Answer no. 4:
newspaper weight = 454 g
lighter magazine. = 280 g –
magazine weight. = 174 g

So, the weight of the magazine is 174 g.

Figure 4: Student answers on the fourth problem.

Furthermore, the last aspect was solving story problems related to determining the LCM. Students were asked to determine the day and date of the two cooperative suppliers who came together if each supplier differed in multiple the day of arrival. Moreover, students were asked to determine the LCM of two numbers. This topic obtained an average score of 2.25 or was in the low category. Figure 5 below is an example of student answers in answering question number 5.

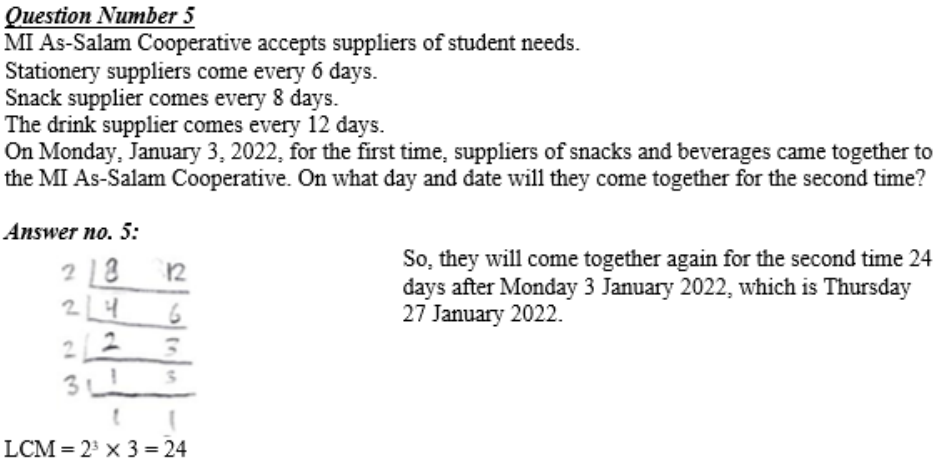

Figure 5: Student answers on the fifth problem.

Based on the study results, it was found that the numeracy literacy of *madrasah ibtidaiyah* students after the Covid-19 pandemic in numbers was in a low category, with an average score of 67.61. If it was reviewed based on initial skills, the students' numeracy literacy had increased on average from a score of 56.20. The score of student learning outcomes was one of the student's achievements in learning mathematics. A person who did not have good numeracy literacy skills could not participate fully in school, both in secondary, continuing, and higher education, nor could he take up a satisfying job and career [5]

The increase in the average score was part of the impact of improving the learning process after the COVID-19 pandemic. This learning process also increased students' numeracy literacy skills even though, on average, they were still at a low level. The Bandung city government sought to improve the quality of learning by implementing a limited face-to-face learning policy. Efforts made by the school were by implementing problem-based learning was loaded holistically in an aspect. Problem-based learning-related mathematics to problems that exist in everyday life that could help students to find mathematical concepts, and at the same time, it helps them to improve mathematical problem-solving abilities [19]. From this aspect, the students would get the information and experiences directly; thus, the learning would be more meaningful [20].

Numerical literacy skills in number material consist of understanding fractions, knowing the position of fractions on a number line, comparing two fractions, calculating the result of subtracting two whole numbers, and determining the LCM. The study results on understanding fractions showed that students had competence in the intermediate category. The results proved that most students could represent fractions in pictures. Students used the concept of symbol fractions; that was, the number of squares was shaded as the numerator, and the total number of squares was used as the denominator.

Students were asked to show the fraction 2 5/8 through the picture, meaning that two parts were fully shaded (eight squares), and one part was shaded five out of eight squares. Students also understood fractional material by modelling it in real life [21].

The skills of students to know the position of fractions on the number line could be categorized as a low category. The students' skills were due to the incomplete understanding of students' concepts about fractions represented on a number line. Students understood the concept of fractions but could not represent them on a number line [22]. In comparing two fractions, students' abilities were in a low category. Students did not fully understand the concept of more significant and less than two fractions. Students compared fractions based on the most significant number and whole numbers. Students often forgot to match the denominators; however, they could compare fractions after the denominators were the same [23].

Calculating the result of subtracting two whole numbers was categorized as intermediate. The prerequisite materials had been met, and students understood the concept well. Students could distinguish the numbers of units, tens, and hundreds so that when adding or subtracting, they could place the position of the number. Students could also distinguish between questions and how to do them using the short and long methods [24].

Students had basic level skills in determining the LCM of two numbers. Students had not been able to apply the concept well. There were unfulfilled prerequisite materials such as prime numbers, multiplication, and division. Some students also had difficulty discussing the LCM related to the date story, meaning that students also had to know the number of days in a month [25].

In general, the numeracy literacy profile of *madrasah ibtidaiyah* students throughout Bandung was at level 2 (grade 4), which was in the basic category, meaning that students were only limited to concepts but could not relate them in the context of real life. Numerical literacy could be defined as the skills possessed by a person to use his mathematical knowledge to explain events, solve problems, or make decisions in everyday life. Mathematical literacy and numeracy focus not only on understanding mathematical concepts but furthermore on the skills to apply these mathematical concepts. Thus, there was a need for improvement in various aspects because the concept of numeracy was not limited to applying skills in number operations but also related to mastery of concepts and mathematical thinking skills in general.

The problem-based learning process needs to be applied routinely in the post-covid-19 pandemic. Although mathematics learning is abstract, learning must be changed to concrete by requiring media as a real learning intermediary. As in the number material,

where numbers are abstract but can be concreted using real objects, number blocks, fraction boards, or number cards. Thus, the competencies that have been planned as well as students' numeracy literacy skills increase in the advanced category. This is in line with PISA 2015 which states that at level two students are able to interpret and recognize conditions in a simple context, namely, to come to direct conclusions [10]. Students are able to extract appropriate information from a single source and use a single representation method. Students at this level are able to use basic algorithms, formulas, procedures or habits to solve problems with numbers. At this level students can also make literal conclusions.

4. CONCLUSION

This study examined the numeracy literacy profile of madrasah ibtidaiyah students' post-covid-19 pandemic on number material. The results showed that students' numeracy literacy skills were in the low category. In this study, students' numeracy literacy skills on number material were: (1) having basic computational skills in the form of direct equations shown through the skills to understand fractions in the intermediate category; (2) knowing the position of the fraction on the number line was in the low category; (3) comparing two fractions in the low category; (4) calculating the results of adding and subtracting two whole numbers were in the intermediate category, and (5) determine that the LCM is in the basic category. The post-pandemic Covid-19 learning process was carried out with limited face-to-face alternately. The teacher divided the students in the class into two groups, namely the morning shift and the afternoon shift. Learning led to quality improvement as indicated by a supportive classroom atmosphere and affective support and cognitive activation from teachers even though the learning processes were not as complete as before the pandemic. The limitation of this research was that it focused on the topic of numbers. Hence further investigation might highlight geometry and measurement, algebra, and data and uncertainty.

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