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NUMERACY LITERACY SKILLS OF ELEMENTARY SCHOOL STUDENTS THROUGH ETHNOMATHEMATICS-BASED PROBLEM SOLVING

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ABSTRACT

Background: Numeracy literacy is one of the aspects evaluated in the Minimum Competency Assessment (AKM), referring to the Programme for International Student Assessment (PISA) as a good practice for international level assessment.
Aim: This study aims to analyze the numeracy literacy ability of elementary school students in ethnomathematics-based problem solving.
Method: This research is a qualitative descriptive research with a case study method taking the subject of 28 grade IV students of SDN Lamper Kidul 02. Data collection techniques in this study used tests and interviews. The results showed that students' numeracy literacy skills in level 1 questions were categorized as high, numeracy literacy for level 2 and level 3 questions was categorized as moderate.
Findings: Students' numeracy literacy ability is classified as being in ethnomathematics-based mathematical problem solving, especially in the aspect of understanding problems as the key to problem solving skills, so that students have difficulty in planning settlement strategies, implementing solutions and re-examining results based on existing problem solving stages, this is triggered by students' lack of skill in numeracy and lack of maturity of mathematical concepts student-owned. Indirectly, numeracy literacy skills in problem solving based on ethnomathematics can affect numeracy skills, the maturity of mathematical concepts which is the main factor triggering students' anxiety about mathematics lessons.

KEYWORDS

numeracy literacy, ethnomathematics, problem solving

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INTRODUCTION

A great nation is characterized by its literate society, has a high civilization, and actively advances the world society. Literacy in this context is not just how a nation is free from illiteracy, it is more than how citizens have the ability to compete and coexist globally. In other words, a nation with a high literacy culture demonstrates the nation's ability to be communicative, creative, critical thinking and collaborate to win global competition (Kay & Greenhill, 2011).

The era of the industrial revolution 4.0 and society 5.0 directs the implementation of education based on 21st century skills, namely literacy, competence, and character (Chalkiadaki, 2018). Six basic literacy is the focus of shaping students to have 21st century skills, including: literacy, numeracy literacy, science literacy, financial literacy, digital literacy, cultural literacy and citizenship (Nugraha, 2020). Indonesia has implemented the National Literacy Movement (*Gerakan Literasi Nasional*, GLN) carried out by the Ministry of Education and Culture since 2016. Launched by the government, GLN is implemented through

a school called the School Literacy Movement (*Gerakan Literasi Sekolah*, GLS) to create literate learning organizations and develop the character of school citizens (Ekowati et al., 2019).

The School Literacy Movement also includes mastery of numeracy literacy. Numeracy literacy is the ability to solve practical problems in everyday life by using various numbers and symbols related to basic mathematics as well as being able to analyze the information presented in different forms and interpret the results of such analysis to predict and make decisions (Mahmud & Pratiwi, 2019). Numeracy literacy as one of the aspects evaluated in the Minimum Competency Assessment (AKM) is an important note to pay attention to its implementation in the learning process. Based on the objectives of mathematics learning according to the National Council of Teachers of Mathematics (NCTM) consists of five competencies, namely mathematical problem solving, mathematical communication, mathematical reasoning, mathematical connections, and mathematical representation. All five competencies are covered in mathematical literacy (Faozi et al., 2020). Therefore, numeracy literacy is one of the essential abilities that must be mastered by students.

Listening to the PISA (The Programme for International Student Assessment) score as one of the evaluations of the quality of education of a country in facing challenges in the 21st century. PISA scores in Indonesia have decreased, especially in the aspect of mathematical literacy of students in 2015 Indonesia obtained a score of 386, declining in 2018 with a score of 379 being in 73rd place out of 79 countries (Hewi & Shaleh, 2020). This shows that mathematics numeracy literacy skills in Indonesia are still low, one of the contributing factors is that mathematics is considered a difficult thing so that students are unable to solve mathematical problems related to daily life, class teachers generally only provide mathematical formulas without further explaining the relationship between studying mathematics and daily life (Mansur, 2018).

Numeracy literacy is closely related to solving mathematical problems (Niklas et al., 2016). Without problem solving, the benefits of learning mathematics become limited because the ability to solve problems is at the core of learning mathematics (Pangesti, 2018). Problem solving is not limited to solving routine problems of mathematics but rather to finding solutions to everyday contextual problems that absolutely require reasoning. By solving problems, students try to find solutions that are suitable in their own way to solve problems related to everyday life (Suryapuspitarini et al., 2018).

Contextual solving of mathematical problems is closely related to ethnomathematics as culture-based learning (Owens, 2014). Ethnomathematics comes from the words ethno (ethnicity/culture) and mathematics, simply put, cultural anthropology related to mathematical concepts (Pratiwi & Pujiastuti, 2020). Ethnomathematics as a fusion of culture and mathematics must be connected with realities relevant to people's lives, so that mathematics is not only as a subject, but as a human activity, which is very closely related to local culture (Zaenuri & Dwidayati, 2018).

The previous research by Alfiah et al. (2020), Hapsari (2019), and Rohim et al. (2021) similar to this research is still focused on numeracy literacy related to students' mathematical problem solving ability and student numeracy literacy in improving the implementation of the Minimum Competency Assessment (AKM). While in-depth research related to ethnomathematics-based problem solving has not yet received attention, therefore this research

will be focused on numeracy literacy in ethnomathematics-based problem solving. Such an effort is made to analyze the numeracy literacy skills of elementary school students in ethnomathematics-based problem solving. The benefits of this research are; (1) to describe the numeracy literacy ability of elementary school students in Indonesia; (2) may be a reference material for the development of further research related to the integration of numeracy literacy through ethnomathematics; (3) can assist students in solving mathematical problems related to daily life.

METHOD

This research is a qualitative research with a case study method to analyze students' numeracy literacy skills in ethnomathematics-based problem solving. The research was conducted at SDN Lamper Kidul 02 with 28 participants in grade IV elementary school. The data collection technique in this study used interview techniques to obtain information directly from the research subjects in depth to teachers and grade IV students as well as test techniques to analyze students' numeracy literacy skills in ethnomathematics-based problem solving. Data analysis uses triangulation techniques, namely source triangulation in teachers and students as research subjects and triangulation techniques using interview techniques.

RESULTS AND DISCUSSION

The Importance of Ethnomathematics in Mathematics Learning

Mathematics learning must be arranged contextually related to students' daily lives, so that students are equipped with the ability to solve mathematical problems in their daily lives. Contextual mathematics is closely related to ethnomathematics, which is mathematics that is integrated with local culture that makes it easier for students to instill concepts, while also giving students value in recognizing and appreciating their culture. Ethnomathematics objects can be used to carry out innovative learning such as, in selling activities, weaving or crafts or webbing in the Maluku community can be integrated in mathematics in the form of fractions and geometry (Lauren et al., 2019), learning by utilizing Borobudur Temple can embed mathematical concepts in the form of number systems, logic and space configuration (Kurniawan & Hidayati, 2020), *Batik* patterns of the Surakarta Palace developed for symmetry material (Astriandini & Kristanti, 2021), calendar implementation java by javanese people to find a good day on the concept of numbers (Prahmana et al., 2021), and the introduction of geometric constructs using janur which is still often used by Javanese and Balinese people (Oktavia & Suparni, 2021).

Research on ethnomathematics proves to be able to improve students' understanding of mathematical concepts such as research carried out by understanding geometry (Hariyadi & Muttaqin, 2020) concepts in problem-based learning charged with ethnomathematics of Semarang City cultural heritage buildings for elementary school students can be a means to increase understanding of geometry concepts, improve students' ability to interpret, analyze mathematical codes, and increase motivation and interest. Self-confidence makes learning more interesting and fun. So that ethnomathematics-based learning is important to study, one of which the author does to analyze students' numeracy literacy ability in solving ethnomathematics-based problems.

Proving this, an interview with Mrs. Chika, a grade IV teacher at SDN Lamper Kidul 02, provided information about ethnomathematics learning in her classroom: "When learning, I rarely give lessons related to culture. Especially in mathematics, I put more emphasis on memorizing formulas and practice questions for students. Moreover, there is a prolonged pandemic for approximately 3 years, so grade IV students are now psychologically still in grade 1 of elementary school, online learning makes students less familiar with Indonesian culture and culture in Semarang, for example When they first entered class IV, few students could sing folk songs (gundul-gundul pacul, suwe ora jamu, padang bulan) and students also did not know about traditions such as dugderan in Semarang".

This means that students are not familiar with the culture and traditions in Semarang City, teachers have also not implemented ethnomathematics-based learning in their classes. This attracts researchers to try to dig deeper into students' numeracy literacy skills by providing ethnomathematics-based questions. By implementing ethnomathematics, it is hoped that it can become a stimulus medium for students to improve numeracy literacy by thinking more critically so that they can solve mathematical problems as well as be adaptive to cultural values in Semarang City.

Students' Numeracy Literacy Skills

The Ministry of Education and Culture through the National Literacy Movement program defines numeracy literacy as knowledge and skills in using various forms of numbers and symbols related to basic mathematics to solve practical problems in various contexts of daily life and analyze the information presented in various forms (Graphs, tables, charts, etc.) then interpret the results to predict in decision making (Poernomo et al., 2021). Basically, numeracy literacy is the ability of children to apply mathematical concepts in everyday life, interpret quantitative information, and understand information mathematically.

Previously, the evaluation tool in Indonesia, namely the National Examination (UN) since 2021, was changed to a National Assessment (AN) in accordance with the demands of 21st century learning. AN consists of three parts, namely Minimum Competency Assessment (AKM), Character Survey, and learning environment survey. AKM is followed by learners to measure cognitive aspects through literacy and numeracy (Indahri, 2021). It creates a new paradigm that the National Assessment is not a substitute for the National Examination that determines whether or not students pass it, but the AN Results are a portrait of the service and performance of each school as a source of real information to map and evaluate the quality of the education system in each school in order to accelerate the improvement of the quality of education in Indonesia.

Numeracy Literacy is one of the aspects evaluated in the Minimum Competency Assessment (AKM) which refers to the good practice of international level assessment, such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS). Numeracy literacy assessment in AKM can be reviewed from 3 components (aspects), namely content (algebra, numbers, geometry, measurement, data and uncertainty), cognitive processes (understanding, application, and reasoning), and context (personal, socio-cultural, and scientific) (Deviana & Aini, 2022).

In this study, several indicators were taken according to Purwasih et al. (2018), each aspect related to numeracy literacy used in AKM guided by PISA which consists of 6 levels, which can be seen in Table 1. Followingthis:

Table 1. PISA Numeracy Literacy Ability Indicators

Level	Indicator
Level 1	Answer questions with known context and all relevant information from clear questions. Collecting information and carrying out ways of settlement in accordance with clear orders
Level 2	Interpreting, recognizing situations and using formulas in solving problems
Level 3	Carry out procedures well and select and implement simple problem-solving strategies. interpret and represent the situation
Level 4	Work effectively with models in concrete but complex situations and represent different information and relate it to real situations
Level 5	Work with models for complex situations and select and implement strategies in solving complex problems
Level 6	Making generalizations and using mathematical reasoning in solving problems and communicating them

The determination of 6 levels according to PISA as a standard that needs to be followed to be able to measure students' numeracy literacy skills is implemented in the implementation of the Minimum Competency Assessment (AKM). There are differences ranging from the content and context of reading, cognitive levels and question indicators from various levels, at the elementary school level the implementation of the Minimum Competency Assessment (AKM) is carried out for class V with cognitive levels level 1-level 3 (Zukhrufurrohmah & Putri, 2021). Therefore, the test instrument developed in this study refers to the PISA numeracy literacy indicator level 1 - level 3 with a question type that refers to the implementation of AKM. Researchers test students' numeracy literacy skills with test instruments in the form of multiple-choice questions and level 1-level 3 descriptions. The results of the instrument test on students' numeracy literacy skills can be seen in Table 2:

Table 2. Students' Numeracy Literacy Skills

Numeracy Literacy Indicators	Number of Questions	Average Score	Category
Level 1 (Geometry and measurement)	2	2,8	High
Level 2 (number)	1	1,7	Medium
Level 3 (Algebra)	2	1,4	Medium
Total	**5**	**2,0**	**Medium**

Table 2 shows the results obtained by students in completing numeracy literacy test questions level 1-level 3. The level 1 numeracy literacy indicator in the table shows that students achieve an average of 2.8 which can be categorized as high, meaning that students are already good at answering questions in the context of relevant information so that they can

carry out ways of solving according to clear commands. Meanwhile, the level 2 numeracy literacy indicator in the table shows that students only achieve an average of 1.7 with a moderate category, meaning that students are quite able to interpret, recognize situations and use formulas in solving problems. While the level 3 numeracy literacy indicator in the table shows that students only achieve an average of 1.4 with a moderate category, meaning that students are quite able to carry out procedures well and choose and apply simple problem-solving strategies and interpret and represent situations, in conclusion, students' numeracy literacy skills are classified as moderate with a score of 2.0 in solving ethnomathematics-based problems.

Students' Numeracy Literacy Skills in Solving Problems

Students should have good mathematical problem-solving skills so that students can find problem solving in learning and daily life, besides that it will indirectly require students to think critically and creatively. Indicators of the achievement of mathematical problem-solving ability in students according to Polya in Anugraheni (2019) consist of: (1) Understanding the problem, that is, the student's ability to refer to what is known, asked, and needed; (2) Planning a settlement strategy, that is, students can find the relationship between the information obtained; (3) Carry out the settlement, that is, students can solve problems based on the solution plan that has been developed; (4) re-examine the results based on the existing steps, i.e. the student is willing to double-examine the steps that have been taken to find the expected results. This is what is used as an indicator of problem solving in this study.

Analysis of student problem solving at numeracy literacy level 1 on aspects of geometry and measurement that measure the competence of recognizing quadrangles, triangles, multifacets, and circles. It is proven by the results of numeracy literacy skills of level 1 students with an average high score of 2.8. The teacher also explained about the condition of students if they do multiple-choice math problems as follows: "Students are easier to do multiple-choice questions, because multiple-choice questions provide answer choices that help students to answer questions, so students can do questions easily without needing more ability to analyze and count, especially multiple-choice questions with a stimulus in the form of pictures, tables, posters, can help students in solving problems on problems and thinking critically."

Based on this, it is easier for students to understand multiple-choice questions that are closed-door questions with clear and straightforward question commands that are characteristic of level 1 questions. Providing stimulus in the form of images that are contextual with the surrounding environment makes students to think more critically about solving problems in the problem. This is where ethnomathematics plays a role in the problem embodied in the stimulus about the image of historical buildings in Semarang City. The question asks students to determine the flat buildings contained in historical buildings in Semarang City (*Lawang Sewu* and *Sam Poo Kong*). This can facilitate students to be able to construct an abstract flat building concept embodied in the problem with a contextual flat building image in the form of a building in the city of Semarang. This type of contextual problem can create a fun learning environment that can dispel the notion that mathematics is difficult and scary.

Solving students' problems at numeracy literacy level 2 in the aspect of numbers with measured competence, namely determining the KPK, factors of a small number and FPB can be further seen in figure 1:

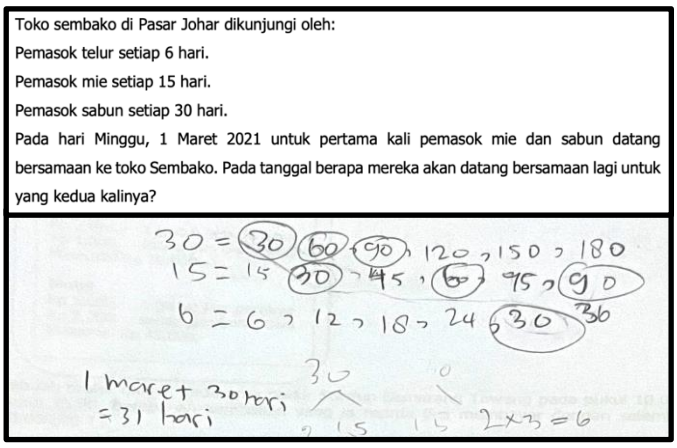


Figure 1. Level 2 Numeracy Literacy Analysis

Based on Figure 1, level 2 numeracy literacy skills only reach an average of 1.7 with a moderate category, as evidenced by the example of answering level 2 questions that students do not fully have good problem-solving skills. Problem solving is the student's first step in developing ideas to acquire new knowledge and develop mathematical skills, since solving mathematical problems necessarily requires other mathematical abilities or skills to obtain solutions to the problem (Mita et al., 2019).

The weakness of students in solving mathematical problems can be seen in the first problem-solving indicator, namely understanding the problem, students have not been able to mention what is known, asked, and required, thus hindering the next problem-solving step, namely, planning a solution strategy by looking for relationships between the information obtained, it can be seen that students have been able to plan the solution strategy, but students have not been able to implement Proper completion Based on the completion plan that has been made, this is because the student has not understood the problem of asking for the date of the noodle and soap supplier who will come together again for the second time. It can be seen that students solve it by looking for KPK from suppliers of eggs, noodles, and soap, even though the only thing asked is the supplier of noodles and soap, although the students' answers are correct, but the students solve problems that are not quite right. As a result, if you do other similar questions, students may do it wrong because they do not understand the problem and do not re-examine the answers used.

In line with research by Putri & Warmi (2022) on students' mathematical problem-solving ability in solving mathematical PISA problems on number content, students often make fundamental and causal mistakes, namely not understanding problems about numbers, not being able to draw up problem solving plans, not being able to carry out problem plans and not being able to look back at results and processes. In line with the Research conducted by Yayuk et al. (2020) shows that grade V elementary school students still have difficulty in dealing with problem-solving lessons using non-routine questions, students have difficulty in understanding the questions, becausethe solutions proposed are not well structured, not thorough, and unsystematic. So they face difficulties in implementing strategies to solve problems.

Solving students' problems at level 3 numeracy literacy in the algebraic aspect with measured competence, namely solving linear equations of 1 variable, can be further seen in Figure 2 below:

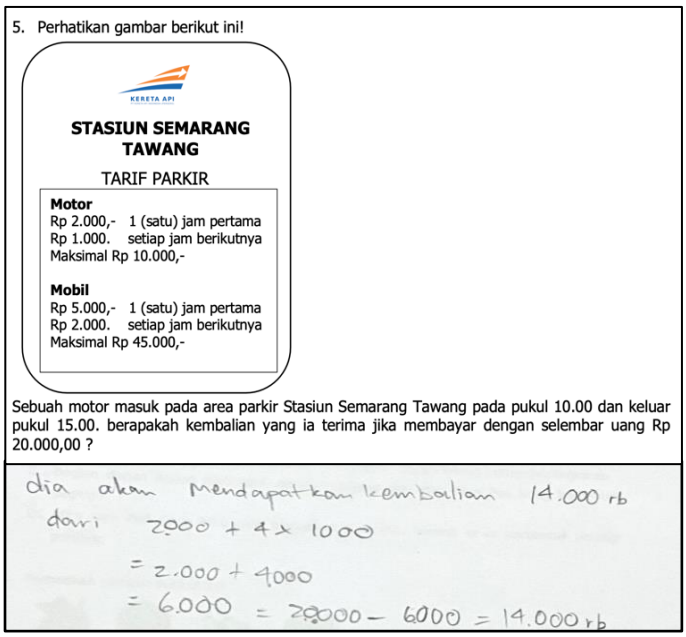


Figure 2. Numeracy literacy level 3 questions

Based on Figure 2, in the answer to the question, only 8 students out of 28 students gave the right answer, in line with the level 3 numeracy literacy ability produced the lowest average of 1.4 with a moderate category, as evidenced by the example of the level 3 question answer that students have good problem-solving skills in solving mathematical problems seen in the first problem-solving indicator, namely understanding the problem, Although students cannot mention what is known, asked, and required, students have understood the meaning of the problem by estimating the possibility that occurs first before proving it, so that in the next problem-solving step, namely, planning a settlement strategy by looking for relationships between the information obtained, it can be seen that students can already plan the solution strategy and can carry out Settlement appropriately based on the settlement plan that has been made. On the other hand, as many as 20 students who answered incorrectly, were constrained by understanding the problem, students had not been able to understand the stimulus of contextual questions in the form of parking rate drawings at Tawang Station, so that the planning and implementation of problem solving produced incorrect answers, a sign that understanding of the problem is the main key in solving mathematical problems in elementary school students.

Strengthened by the teacher's explanation of the math problem in the form of the following description: "To be honest, students find it difficult to do description questions, because students are used to doing multiple-choice type questions, so the students' ability to reason the meaning of the questions given is somewhat lacking. I also observed that some students have anxiety in students whose numeracy skills are lacking due to learning loss experienced during the 3 years of the pandemic psychologically, grade IV students are still in the first grade of elementary school, so that students lose their mathematical concepts maturely, students become often hesitant, answer perfunctorily and even often do not answer questions When presented with description-type questions, Because students who are not mature with mathematical concepts are already confused about whether they can calculate correctly or not, even though they do not understand the meaning of the problem".

The results of the interview illustrate that students have not been able to become good problem solvers in the types of level 2 and 3 description questions. Lack of numeracy skills, maturity of mathematical concepts are the main factors triggering student anxiety (anxiety). So it needs guidance through learning mathematics which leads to the process of developing problem-solving skills. One of them is by teaching mathematics that is textual to contextual mathematics that is full of students' daily lives. Learning activities that use contextual problems make it easier for students to solve a problem presented, contextual mathematics problems based on local wisdom help students for the ability to think creatively, the ability to think critically and the ability to construct knowledge so as to eliminate student anxiety in the learning process (Zahrah & Febriani, 2020).

By presenting real-life-based problems in the lesson, can stimulate students to apply problem-solving steps correctly and make effective decisions in solving problems, in this way, can contribute to preparing students for real-life conditions (Yurtseven et al., 2021). Therefore, mathematics learning that is abstract should be complemented by learning that can concrete the abstraction. So that the teacher not only provides contextual problems for students to solve, but must be integrated with all learning components (activities, methods, techniques, media) that are based on real life or contextual. In accordance with the objectives of learning mathematics, namely having factual and conceptual abilities in science (Unaenah & Sumantri, 2019). In line with the stage of development of elementary school students (7-12 years) according to Piaget enters the development of the concrete operational stage. The characteristic at this stage is that the child can already solve an empirical problem, but has difficulty in solving an abstract problem (Juwantara, 2019). For example, children can already understand various types of sizes (length, weight, volume) but still have difficulty converting these sizes. Learning should be arranged more concretely according to the student's learning environment, so that students have good problem-solving skills.

Therefore, real objects are important for the teaching and learning of mathematics. They help students connect math with real objects found in their everyday environment. They help students realize that mathematics is not abstract and there are many ways to understand a concept. Contextual learning can develop conceptual and understanding of mathematical concepts can be done by teachers, because real objects can help students learn mathematics relationally and rationally rather than rote memorization (Deogratias, 2022). The theory of constructivism supported by the theories of Perkins, Piaget and Vygotsky also explains that the individual can build knowledge through his environment (Ramadhani, 2018).

Learning with ethnomathematics or mathematics based on local wisdom provides a learning environment that creates good motivation and is more enjoyable so that students have a great interest in participating in mathematics learning which is expected to affect their mathematical abilities, especially mathematical problem solving skills as one of the efforts that can be made to improve numeracy literacy is by providing material and integrating learning with ethnomathematics and providing higher order thinking skills (HOTS) related to real life.

CONCLUSION

Numeracy literacy is one aspect that is evaluated in the Minimum Competency Assessment (AKM) which refers to the good practice of international level assessments, such as the Programme for International Student Assessment (PISA). Numeracy literacy skills are related

to solving students' math problems. Based on the literacy ability test with questions referring to PISA level 1-3, it was found that students' numeracy literacy in level 1 questions is categorized as high, meaning that students are good at answering questions in the context of relevant information so that they can carry out ways of solving according to clear commands. Meanwhile, the numeracy literacy indicator level 2 with a moderate category, means that students are quite able to interpret, recognize situations and use formulas in solving problems. Meanwhile, the numeracy literacy indicator level 3 with a moderate category, means that students are quite able to carry out procedures properly and choose and apply simple problem-solving strategies and interpret and represent situations.

In general, the numeracy literacy ability of elementary school students is categorized as being in ethnomathematics-based problem solving, because in solving problems, students do not understand the problems in the problem, so students will find it difficult to plan a solution strategy, carry out solutions and re-examine the results based on the existing problem solving stages. This is triggered by students' lack of skill in numeracy and understanding of mathematical concepts due to learning loss for 3 years making students feel anxious when learning mathematics.

Therefore, it requires the ability of teachers to carry out creative and innovative learning with contextual learning. The importance of ethnomathematics-based learning is not enough to only be applied to problems, but should be integrated into the learning process, so as to develop numeracy literacy skills and solve student problems related to daily life, ethnomathematics also makes students more adaptive to cultural fair values in Semarang City. Through this research, it is hoped that further research can be carried out to develop and improve the numeracy literacy skills of elementary school students.

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