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Integrating Local Wisdom into Numeracy Literacy: An Analysis of Students' Competence in the Number Domain in Sigi Regency, Indonesia

Hajerina[1,4*], Mery Napitupulu[2], Rita Lefrida[3], & Richard Albert Walanda[5]

[1]Department of Science Education, Universitas Tadulako, Indonesia

[2]Department of Chemical Education, Universitas Tadulako, Indonesia

[3]Department of Mathematics Education, Universitas Tadulako, Indonesia

[4]Department of Mathematics Education, Universitas Alkhairaat, Indonesia

[5]Department of Computer Science, University of Newcastle, Australia

Abstract: Numeracy literacy is one of the basic competencies that support students' success in academic and social life. This study aims to analyze the numeracy literacy skills of junior high school students in Sigi Regency, Central Sulawesi Province, Indonesia, particularly in the domain of numbers, based on local wisdom such as the traditional Souraja buildings and agricultural practices of the residents of Sigi Regency. The sample comprised 120 eighth-grade students from six public junior high schools in Sigi Regency, representing diverse geographical characteristics (mountainous, rural, and urban) and varying educational performance levels. They were selected through purposive sampling and the mixed methods approach with an Explanatory Sequential Design as the research methodology. Data were collected using a numeracy literacy test developed using the AKM framework and numeracy competence indicators from the Ministry of Education, Culture, Research, and Technology (2023). The results showed that only 10% of pupils reached the "Proficient" level. Most of them (65%) are in the 'Basic' or 'Requiring Special Intervention' group. This decline in results is due to traditional teaching methods that fail to connect the material to the students' local environment. Teaching math has not fully utilized local knowledge, such as how to do business in traditional markets and how to farm. These results indicate the need to revise the approach to teaching mathematics in schools, with an emphasis on integrating local knowledge into learning, namely, developing teaching methods that link mathematical concepts to students' daily lives, so that they are more relevant and engaging for students. In addition, this locally-based approach is expected to improve students' numeracy understanding and skills, especially for those who are still at a basic level or need special intervention. The development of a more contextual curriculum based on students' real experiences can also enrich the learning process and encourage significant improvement in academic outcomes.

Keywords: numeracy literacy, number domain, local wisdom of sigi.

▪ INTRODUCTION

Numeracy literacy is one of the essential basic competencies that support students' success in academic and social life. Numeracy literacy is the ability to use simple or basic mathematics to help solve practical problems in everyday life (Inayah et al., 2022). In the context of the Merdeka Curriculum, numeracy literacy is defined as the ability to understand, use, evaluate, and communicate quantitative information and mathematical concepts in various real-life situations (Kemendikbudristek, 2023). Numeracy literacy is one of the basic competencies measured through the Minimum Competency Assessment (AKM), which is implemented as an evaluation tool in educational institutions (Miftah & Setyaningsih, 2022).

The National Assessment consists of three main components, namely AKM, Character Survey, and Learning Environment Survey. AKM is designed to measure

Hajerina
*Email: hajrinahamid@gmail.com

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students' literacy and numeracy skills. The numeracy content in AKM covers several main domains such as algebra, numbers, geometry, measurement, as well as uncertainty and data (Kemendikbud, 2021). The number domain, as one of the main components in numeracy assessment, includes skills in recognizing values, comparing, representing, and performing basic mathematical operations in everyday contexts.

The results of the 2023 National Assessment show that the numeracy literacy skills of junior high school students nationwide are still inadequate, especially in the domain of numbers, which measures basic mathematical skills (Pusmendik., 2023). This is also a concerning issue in the Sigi Regency, Central Sulawesi Province. The 2023 Education Report indicates that junior high schools in Sigi Regency have numeracy literacy scores that are predominantly red, with the lowest domain being the number domain, which has a competency score of 50.54. Several issues that are at the root of low numeracy skills in the Sigi Regency Education Report are: (1) The quality of learning, because learning content can improve students' numeracy skills, especially if the learning content comes from qualified teachers. (2) Reflection and improvement of learning by teachers, because reflection and improvement of learning need to be carried out continuously through learning communities as a forum for teachers and education staff to continue to strive to improve the quality of their services, such as participating in contextual numeracy-based teacher training and implementing local culture-based learning. This is in line with findings that one of the factors affecting low numeracy skills is the influence of teachers, including their subject knowledge and teaching methods (Cao Thi et al., 2023). Therefore, teachers can support the development of numeracy skills by focusing on the teaching process and designing instructional materials that address students' numeracy needs (Sa'dijah et al., 2023; Stephens, 2009)

According to Laksana (2024), the low achievement of students in numeracy is not only caused by a lack of conceptual mastery, but also by the low relevance of the questions to the students' real lives. This shows that numeracy literacy skills, particularly in the domain of numbers, cannot be sufficiently developed through conventional instructional approaches that are procedural and textual in nature. Instead, students need learning experiences that are contextual, reflective, and based on local socio-cultural conditions. This is in line with the view that, in order to develop numeracy literacy in a local context, students should work on open-ended problems and use real-world contexts such as mathematical modeling (Kaiser & Willander, 2005). In addition, the application of social-cultural-based learning or ethnomathematics can develop students' numeracy skills (Anwar & Mailizar, 2021; Fouze & Amit, 2018, 2019; Ramadhani et al., 2025; Xu et al., 2025).

Sigi Regency has cultural potential and local economic activities such as agriculture, animal husbandry, and customs that are rich in mathematical context, such as in the domain of numbers. The local wisdom of Sigi can be linked to the domain of numbers in mathematics through concepts that exist in the daily lives of the Sigi community, such as farming activities, namely planting and harvesting times, which are carried out using traditional calculations based on seasonal cycles. In addition, local wisdom in terms of cattle maintenance, where the Sigi community has a tradition of calculating the time when cattle leave the barn and return to the barn (Wardi, 2019). Unfortunately, many other local intelligences in Sigi have not been optimized in the development of numeracy assessment and learning strategies. Meanwhile, low numeracy

skills at school age will have an impact on individuals' competitiveness in the future, especially in data-based decision making, financial management, and productive economic activities (OECD, 2023; Popovic & Lederman, 2015).

Many researchers are concerned with improving students' numeracy literacy by developing mathematics questions similar to the numeracy questions in the AKM (Fery et al., 2017; Oktiningrum & Hartono, 2016; Umbara & Suryadi, 2019). Several of these studies highlight the importance of examining students' deficiencies in solving numeracy problems in greater depth. However, an in-depth analysis of the numeracy literacy abilities of students in Sigi Regency in the domain of number assessment has not yet been conducted. In fact, Sigi Regency is unique for research related to numeracy skills for several reasons related to its distinctive social, cultural, and geographical context, such as the diversity of local wisdom in Sigi that can be integrated into contextual mathematics learning, particularly in the domain of numbers, namely agricultural activities, trading in traditional markets, and natural resource management involving calculations and measurements. Another reason is the geographical conditions that affect access to education, as most of Sigi Regency is located in mountainous and remote areas. Therefore, conducting a numeracy analysis in Sigi can provide deeper insights into the challenges and opportunities in improving numeracy literacy in areas with limited access to education.

This study aims to analyze students' numeracy literacy in the domain of numbers based on local wisdom in Sigi Regency, in order to map student competency profiles and identify factors causing low numeracy achievement. The results of this analysis are expected to form the basis for the development of relevant and contextual learning approaches and educational policy interventions. To achieve the objectives of this study, several questions must be addressed, specifically: How is the numeracy literacy of students in Sigi Regency in the domain of numbers using a local wisdom-based approach? What are the factors that cause low numeracy literacy achievement among students in Sigi Regency in the domain of numbers?

▪ METHOD

Participants

The population in this study was all eighth-grade students in public junior high schools in Sigi Regency, Central Sulawesi, in the 2024/2025 academic year. Purposive sampling was used to determine the research sample, namely students from six public junior high schools representing different geographical characteristics (urban, rural, and mountainous) and educational report card rankings (Top ranking, Upper middle rank, Middle rank, Lower middle rank, and Bottom ranking).

The sample size was 120 students, as described in Table 1, with 20 students from each school. The sample selection took into account the proportional distribution of academic ability based on report card data and recommendations from mathematics teachers.

Table 1. Participant demographics

Category	Description	Total	Percentage (%)
Gender	Female	65	54.2
	Male	55	45.8
	Upper-middle class	23	19.2

Socioeconomic Background of Parents	Middle Economy	55	45.8
	Lower-middle class	42	35
Average mathematics score	Average > 80	37	30.8
	Average 70-80	44	36.7
	Average < 70	39	32.5

Research Design and Procedures

This study employed a mixed-methods approach with an explanatory sequential design to gain an empirical understanding of the numeracy literacy abilities of students in Sigi Regency, specifically in the domain of numbers. This was followed by semi-structured interviews with teachers at participating schools and students selected from each sample school. This approach was chosen because it is suitable for measuring students' numeracy achievements objectively and systematically, based on quantitative data analyzed statistically (Sugiyono, 2022). To ensure uniform testing conditions across six different schools, administrative procedures were carried out consistently, including providing the exact written instructions, a uniform duration of work, and arranging classrooms free from distractions. The tests were monitored and supervised directly by the research team and classroom teachers to ensure the integrity of the process and prevent any external intervention that could affect the results.

In addition to quantitative data collection through tests, this study also used semi-structured interviews to obtain additional information about the factors that influence students' numeracy skills. The interview protocol was carried out using the same procedure in all schools, beginning with an explanation of the purpose of the interview, a guarantee of confidentiality, and the use of flexible guiding questions so that respondents could develop their answers. Key questions asked of teachers included their perceptions of students' numeracy skills, challenges in teaching mathematics, learning methods used, and factors considered to influence student achievement. Meanwhile, questions for students included their experiences learning mathematics, difficulties encountered in understanding numbers, the relevance of the material to their daily lives, and their views on the application of local wisdom in mathematics learning. With this combination of quantitative and qualitative data, the study is expected to provide a comprehensive picture of students' numeracy competency profiles and the factors that influence their achievement in Sigi Regency.

Instruments

The main instrument used was a numeracy test in the domain of numbers, which was developed based on the numeracy competency indicators from the Ministry of Education, Culture, Research, and Technology (2023) and referred to the AKM framework (Kemendikbudristek, 2023). This exam consists of 9 multiple-choice questions, complex multiple-choice questions, and short-answer questions covering everyday contexts, such as buying and selling traditional foods from Sigi Regency, measuring Souraja houses, comparing the sizes of Souraja houses, comparing the time it takes to build Souraja houses, and the agricultural and fisheries system known as Mina Padi, which is a tradition of the Sigi people in rice cultivation and fish farming, as explained in the numeracy test grid in Table 2. The questions have undergone content validation by two mathematics education experts and reliability testing with a Cronbach's Alpha value of 0.898, indicating that this test is reliable because an instrument is

considered reliable if its reliability factor is greater than 0.70 (Fraenkel et al., 2012; Yusup, 2018). However, if the Cronbach's alpha reliability coefficient is less than 0.70, it is necessary to revise or even remove items that have low correlations (Tavakol & Dennick, 2011).

Table 2. Numeracy test instrument grid

Domain	Sub Domain	Class	Context	Competence	Indicator	Cognitive Level
Numbers	Operation	8	The socio-cultural aspects of Sigi Regency are reflected in its *Souraja* traditional buildings, as well as its agricultural and fisheries systems.	Solve problems related to arithmetic operations of whole numbers and fractions	1. Able to identify relevant information in math problems involving whole number operations. 2. Able to formulate the right steps or strategies to solve the math problem. 3. Able to perform whole number counting operations as needed in the context of the problem.	Question 1: Understanding Question 2: Application Question 3: Application Question 4: Application Question 5: Reasoning Question 6. 7. 8. 9: Understanding, Application, and Reasoning

Data Analysis

Data were collected through two main techniques: numeracy tests, which were administered directly at each school for 80 minutes, and semi-structured interviews with mathematics teachers and students. These interviews provided supporting data to interpret the test results in a more contextual manner. Qualitative findings from semi-structured interviews with teachers and students can be used to provide a deeper context for quantitative numeracy test results. For example, suppose test data shows that many students are at a low level of numeracy (such as in the “Basic” category). In that case, interviews with teachers can explore the reasons behind these low scores, such as challenges in teaching methods or a lack of resources. Interviews with students can also provide insights into their learning experiences, the difficulties they encounter, and their perceptions of the material being taught, which helps explain the numeracy results more holistically.

The numeracy test data were analyzed descriptively using statistics such as mean values, standard deviations, and the percentage of achievement for each numeracy indicator in the number domain. Further analysis was conducted by categorizing students' abilities into four levels based on the numeracy assessment framework from the Ministry of Education and Culture (Kemendikbud, 2020) and present in Table 3.

Table 3. Numeracy competency proficiency levels

Level	Indicator
Proficient	Students can reason to solve complex and non-routine problems based on their mathematical concepts.

Elocquent	Students can apply their mathematical knowledge in a broader range of contexts.
Basic	Students have basic mathematical skills: basic computation in the form of direct equations, basic concepts related to geometry and statistics, and solving simple, routine mathematical problems.
Special Intervention Needed	Students have limited mathematical knowledge. Students demonstrate partial mastery of concepts and limited computational skills.

Data analysis was performed using SPSS version 26 software to ensure accuracy in data processing and presentation. Interview data were analyzed qualitatively using reduction, categorization, and interpretation techniques to strengthen understanding of the contextual factors that influence test results.

▪ RESULT AND DISSCUSSION

This study examines the numeracy skills of students in Sigi Regency. It analyzes the interaction patterns between school location factors, providing insight into the geographical, social, and economic influences on student academic achievement and education report card rankings. The location of schools in rural or remote areas, such as most of Sigi, can affect education report card rankings, especially in terms of access to educational resources, such as learning facilities, availability of books, and learning aids. Schools in more remote or hard-to-reach areas often face major challenges in terms of educational infrastructure, which can hinder the learning process for students. For example, students in rural areas such as Pipikoro Village in Sigi Regency have limited access to technology and the internet that support interactive mathematics learning. This leads to differences in numeracy outcomes, where students from schools that are more centralized in cities may have higher report card rankings due to better access to resources.

The location of a school often reflects the socioeconomic background of its students. Schools located in urban areas or regions with more advanced economies tend to have parents with higher levels of education and better economic resources. This can have a direct impact on student achievement levels. For example, students from families with higher incomes and stronger parental educational backgrounds tend to have better access to additional lessons, private tutoring, or other educational facilities that can support the development of their numeracy skills. Conversely, students from schools in areas with lower economic levels may face greater limitations, which are reflected in lower report card grades.

We will analyze the factors described above in terms of their influence on the numeracy skills of students in Sigi Regency, which consists of mountainous, rural, and urban areas. Data on the numeracy literacy of junior high school students in Sigi Regency, based on the location of the school and the education report card ranking in the regency/city, can be seen in the following breakdown:

Analysis of Students' Numeracy Literacy in Public Junior High Schools in Sigi Regency Based on the Location of the School (Mountainous, Rural, Urban).

Based on the results of numeracy tests given to 120 eighth-grade students from six junior high schools in Sigi Regency, data on the numeracy literacy of students in public

junior high schools in Sigi Regency were obtained based on the location of the schools, as presented in Table 4 below. The following diagram compares the numeracy literacy of students attending schools in mountainous, rural, and urban areas in Sigi Regency.

Table 4. Numeracy test results based on school area

No.	Ability Category	School Area	Number of Students	Percentage (%)
1.	Proficient	Mountainous	0	0%
		Rural	5	4.17%
		Urban	7	5.83%
2.	Elocquent	Mountainous	6	5%
		Rural	13	10.83%
		Urban	11	9.17%
3.	Basic	Mountainous	19	15.83%
		Rural	12	10%
		Urban	11	9.17%
4.	Special Intervention Needed	Mountainous	15	12.50%
		Rural	10	8.33%
		Urban	11	9.17%
Total			120	100%

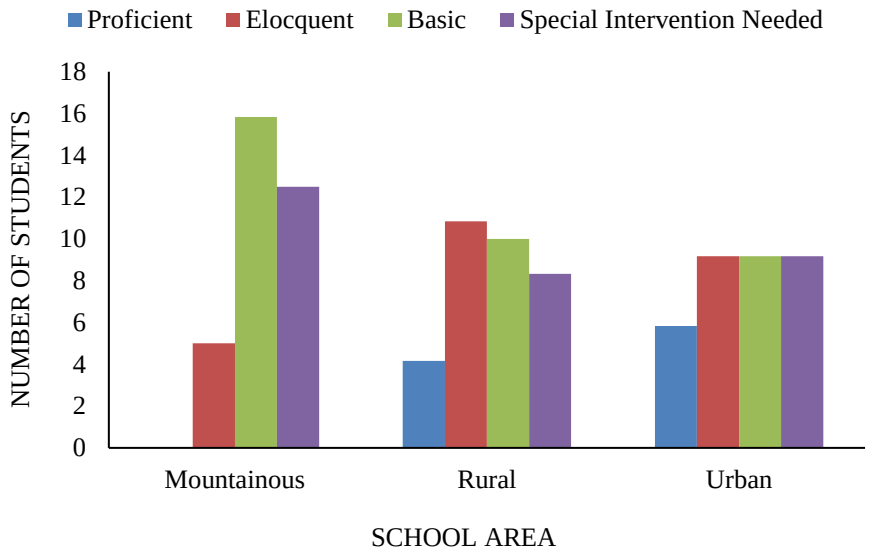

Figure 1. Numeracy test results based on school area

Table 5. Anova test

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	168	3	56	4.307692	0.043778	4.066181
Within Groups	104	8	13			
Total	272	11				

The data show that there are significant differences in students' numeracy test results based on school location, namely mountainous, rural, and urban areas, where the

p-value (0.043) is less than 0.05. In mountainous areas, the majority of students fall into the "Basic" and "Requires Special Intervention" categories, with no students classified as "Proficient." On the other hand, the distribution is more uniform in urban regions, where a larger proportion of students are classified as "Proficient". This is in line with the findings of Gorkem and Adesoji in their research in Nigeria that students in urban areas achieve higher academic results than their peers in rural areas, reflecting inequality in resources and infrastructure (Avcı & Oni, 2025).

Bronfenbrenner's Bioecological Systems Theory posits that interactions across many environmental systems, ranging from microsystems such as family and school to macrosystems including cultural and social policies, influence individual development and transformation (Avcı & Oni, 2025). In hilly areas, a non-conducive environment may limit students' educational opportunities and affect their performance on numeracy tests (Iruka et al., 2020; Zaatari & Maalouf, 2022).

Some of the elements that have a significant influence on how well children do on math tests in cities, the countryside, and the mountains include their socioeconomic status, the quality of their educational resources, and how simple it is for them to learn (Prastyo et al., 2024; Rojas Apaza et al., 2024). Another research found that poverty had a negative effect on students' academic performance. Health problems, insufficient food, and social pressures all contribute to higher dropout rates and worse academic performance in the region (Saifullah & Yawan, 2022). Carroll's (1963) Opportunity to Learn (OTL) hypothesis asserts that students' academic performance is profoundly influenced by the learning opportunities available, including the length of instructional time, the quality of teaching, and the availability of resources. In hilly areas with limited schools and resources, students' OTL may decrease, which can negatively impact their performance on arithmetic exams. Changes in OTL across schools might affect how well kids do on math and reading assessments. For instance, children who are tardy or absent from school might experience significant negative impacts. This suggests that augmenting OTL in resource-limited regions might lead to better academic results for children (Ginsburg et al., 2014).

The difference in test scores based on the school's location suggests that interventions need to be tailored to each region. In education, making it easier for students to get to learning spaces, teacher training programs, and teaching materials may increase their chances of learning (OTL) and, in the end, affect their grades. For education and culture to expand, it will also be vital to raise awareness and empower families. Both of these things will help students perform better in school. Local governments may take action by setting up training programs for teachers in distant locations, providing instructors with resources tailored to the area, and working with communities to improve the learning environment. In addition, guidance is provided to parents regarding the importance of education. In this way, it is hoped that the gap in numeracy test results between regions can be minimized, leading to a more inclusive and equitable education system.

Analysis of Students' Numeracy Literacy at Sigi Regency Based on Education Report Card Rankings

Based on the results of numeracy tests administered to 120 eighth-grade students from six junior high schools in Sigi Regency, data on the numeracy literacy of students

in public junior high schools in Sigi Regency were obtained based on the education report card rankings in the regency/city presented in Table 6 below. The following diagram compares the numeracy literacy of students in top-ranked, upper-middle-ranked, middle-ranked, lower-middle-ranked, and bottom-ranked schools in Sigi Regency.

Table 6. Numeracy test results based on education report card rankings

No.	Ability Category	Education Report Card Rankings	Number of Students	Percentage (%)
1.	Proficient	Top ranking	5	4.17%
		Upper middle rank	2	1.67%
		Middle rank	3	2.5%
		Lower middle rank	1	0.83%
		Bottom ranking	1	0.83%
2.	Elocquent	Top ranking	4	3.33%
		Upper middle rank	8	6.67%
		Middle rank	9	7.5%
		Lower middle rank	5	4.17%
		Bottom ranking	4	3.33%
3.	Basic	Top ranking	3	2.5%
		Upper middle rank	9	7.5%
		Middle rank	11	9.17%
		Lower middle rank	12	10%
		Bottom ranking	7	5.83%
4.	Special Intervention Needed	Top ranking	1	0.83%
		Upper middle rank	5	4.17%
		Middle rank	9	7.5%
		Lower middle rank	8	6.67%
		Bottom ranking	13	10.83%
		Total	120	100%

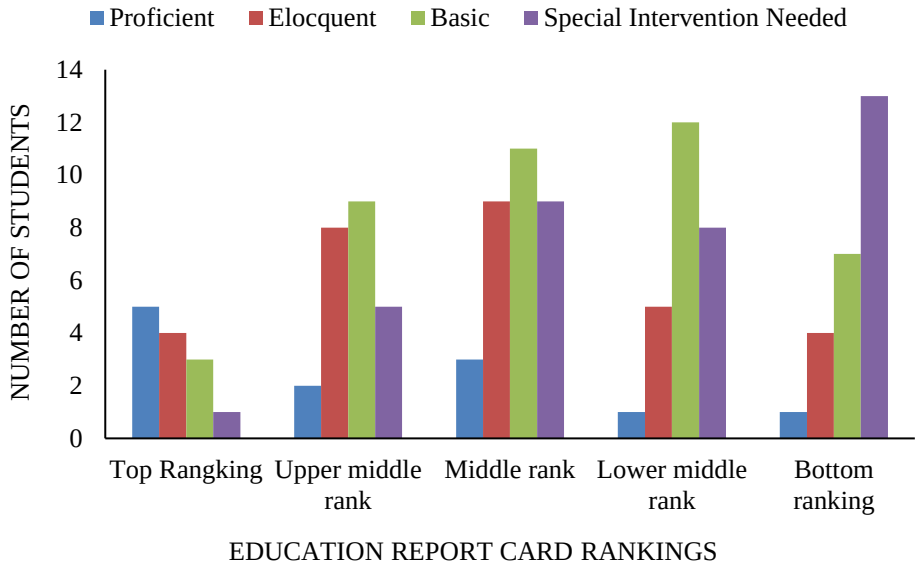

Figure 2. Numeracy test results based on education report card rankings

Table 7. Anova test

Source of Variation	SS	df	MS	F	P-value	F crit
	100.8	3	33.6	3.254237	0.049344	3.238872
Within Groups	165.2	16	10.325			
Total	266	19				

Analysis of numeracy test results based on education report card rankings reveals a significant difference between school report card rankings and student numeracy skills, with a p-value of 0.049, indicating statistical significance. The report card rankings obtained by each school reflect the overall numeracy competency achievement of the school based on the results of the Minimum Competency Assessment (AKM). Student numeracy test results show that most students in the "Proficient" category are in schools with high education report card rankings. Conversely, most students in the "Needs Special Intervention" category come from schools with lower education report card rankings.

These results align with the Theory of Educational Quality, which suggests that students' individual numeracy abilities may be influenced by their academic success, particularly on standardized tests like AKM. In this case, the ratings on the education report card demonstrate how effectively a school assists and promotes pupils' math studies. According to the OECD, the quality of teaching and school practices significantly influences children's performance on tests like AKM (OECD, 2019). Appropriate teaching, appropriate learning management, and the correct instructional materials may all help students become better at arithmetic (OECD, 2019).

Learning atmosphere theory suggests that a supportive school environment creates an ideal atmosphere for learning, including the acquisition of math skills. A supportive school has the necessary facilities, teachers skilled in teaching math, and parents and the community who are actively involved in the learning process. In this case, schools that obtain excellent scores on their report cards are more likely to have a supportive environment and better facilities, which help students do better in arithmetic (Altmann, 2017).

Conversely, schools with poor education report card rankings, which may struggle with teaching quality and educational resources, may be susceptible to pupils exhibiting lower numeracy test scores or necessitating specific intervention to enhance their foundational abilities. According to research, schools that are low-ranked, have inadequate instructors, and lack sufficient resources may exacerbate the academic gap between students in different schools (Hanushek & Woessmann, 2020). A similar finding from PISA (Program for International Student Assessment) suggests that schools with better management and policies are likely to produce students with improved numeracy skills, despite the impact of external factors, such as socioeconomic status, on academic achievement. This illustrates that students perform better on math examinations when their schools have good teachers and administrators. This is evident from the fact that AKM math results vary from school to school, based on their educational report card rankings. The study reveals that 65% of students fall into the basic category, requiring additional support, whereas only 10% demonstrate competence with numbers. This suggests that most students still struggle to genuinely understand numbers and apply them in real-life situations. The results of the interviews between students and researchers were as follows:

P: How was your experience learning math in school? What was the most difficult for you?
S: I found learning math difficult at times, especially when it came to large numbers and fractions. Sometimes, I felt confused when I had to calculate something that I did not know how to apply in everyday life.
P: Did you find it difficult to understand numbers? If so, which part was the most difficult?
S: I find it difficult to relate numbers to everyday life, such as in trade or farming. Sometimes I am unsure how to use them.
P: What do you think makes mathematical concepts difficult to understand?
S: The student replied, "Because I do not see how it relates directly to what we do at home or outside of school."
P: What do you think about learning mathematics using examples from everyday life, like we are doing now? Does this help you understand more easily?
S: Yes, it might help a little. Since I can see how mathematical formulas are applied in everyday life, I will find it easier to understand them. For example, tasks include calculating crop yields or sales profits and determining the dimensions of the *Souraja* building.

Based on the results of interviews with these students, it is clear that more contextual learning methods greatly influence students' numeracy skills. The findings of this study corroborate earlier research (Pusmendik, 2023), indicating that inadequate numeracy abilities in the numerical domain are significantly associated with learning models that are devoid of contextual relevance and disconnected from the students' local realities. Geographical and socio-economic problems exacerbate this situation in places like Sigi Regency. Several factors revealed by teachers in the sample schools hindered student academic achievement, including limited facilities, lack of access to technology, and low levels of parental education. The following are excerpts from teachers' opinions in interviews conducted by researchers:

P: What other factors do you think contribute to students' low numeracy achievement?
G: In addition to teaching methods, socioeconomic factors also play a significant role. Students from families with lower economic backgrounds often lack access to additional materials, such as books or private tutoring, which can significantly impact their understanding of the material. In addition, parental support in the learning process also varies greatly.

In addition, another teacher noted that the biggest challenge for teachers is relating mathematical concepts to their students' lives. For example, teaching numbers in the context of agriculture or trade that is relevant to their lives. Teachers also feel that there are difficulties related to material that is uninteresting or too abstract for students, as well as problems related to time constraints in implementing learning, because they have to follow a fairly dense curriculum.

The OECD (2023) states that numeracy is more than simply being able to count. It also includes being able to use numbers in daily situations. So, learning about numbers should start with cultural context and the local environment, including market operations, agricultural processes, or local trade practices (OECD, 2023).

People believe that incorporating local knowledge into math lessons will make the information more relevant and help pupils understand arithmetic more effectively. This is in line with the realistic mathematics education approach (Gravemeijer, 2020), which emphasizes the importance of meaningful context in mathematics learning.

▪ LIMITATION

This study has several limitations. First, the sample size (N=120) cannot be generalized to the population of junior high school students in Sigi Regency. Second, this study employed semi-structured interviews with teachers and students, which had limitations in terms of the depth of data obtained, as the responses received depended on the participants' ability and willingness to share information. Therefore, the interviews may not fully represent the views or experiences of students and teachers in all of the schools studied. These limitations indicate that although this study provides valuable insights into the numeracy skills of students in Sigi Regency, the results may not fully reflect the situation outside the schools studied. Further research involving more schools, as well as a more in-depth exploration of socioeconomic and cultural factors, could provide a more complete picture of the factors that influence students' numeracy skills, as well as research related to the development of learning tools (teaching materials and student worksheets) based on local wisdom.

▪ CONCLUSION

The quantitative data analysis indicates that the numeracy abilities of eighth-grade children in Sigi Regency remain comparatively poor in the numerical realm. A total of 65% of pupils fall into the "Basic" and "Needs Special Intervention" categories, indicating that most of them struggle with applying numerical concepts to solve real-life problems.

The indicators showing the least progress are those related to converting units and representing numbers, which require a profound grasp of numbers in real-life situations. This indicates a lack of learning opportunities that connect math to significant community events.

The primary issues contributing to students' poor performance include the traditional learning methodology, insufficient incorporation of local settings in practice problems, and inadequate teacher training in formulating contextual numeracy exams. The rich social and cultural background of Sigi Regency, encompassing farming, trading in traditional marketplaces, and natural resource management, has not been fully utilized in the math learning process.

In an increasingly complex and challenging world, numeracy literacy is no longer just an academic skill but a basic skill necessary for survival and development. For this reason, changes in the approach to teaching mathematics in Sigi Regency, especially in the context of local wisdom-based learning, are urgently needed. The results of this study confirm that without significant changes in how the material is connected to students' daily lives, and without utilizing the potential of local culture, we will continue to face gaps in numeracy literacy achievement. Therefore, it is time for all of us, educators, government, and society, to collaborate and take concrete steps in designing and implementing learning strategies that are more relevant, contextual, and inclusive. This change will not only pave the way for improved numeracy literacy but also for a more equitable and sustainable future for future generations.

▪ REFERENCES

Anwar, M. Z., & Mailizar. (2021). The development of an ethnomathematics-based mathematics worksheet for junior high school students using a contextual approach. *AIP Conference Proceedings, 2331*. https://doi.org/10.1063/5.0045499

Avcı, G., & Oni, A. (2025). From home to school: how family and location shape academic outcomes. *The New Educational Review. Https://Doi.Org/10.15804/ TNER.2025.80.2.05*.

Cao Thi, H., Le, T. A., Tran Ngoc, B., & Phan Thi Phuong, T. (2023). Factors affecting the numeracy skills of students from mountainous ethnic minority regions in Vietnam: Learners' perspectives. *Cogent Education*, *10*(1). https://doi.org/10. 1080/2331186X.2023.2202121

Sa'dijah, C., Purnomo, H., Abdullah, A. H., Permadi, H., Anwar, L., Cahyowati, E. T. D., & Sa'diyah, M. (2023). Students' numeracy skills in solving numeracy tasks: Analysis of students of junior high schools. *AIP Conference Proceedings, 2569, Article 040011*.

Fery, M. F., Wahyudin, & Tatang, H. (2017). Improving primary students mathematical literacy through problem based learning and direct instruction. *Educational Research and Reviews, 12*(4), 212–219. https://doi.org/10.5897/err2016.3072

Fouze, A. Q., & Amit, M. (2018). Development of mathematical thinking through integration of ethnomathematic folklore game in math instruction. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(2), 617–630. https://doi.org/10.12973/ejmste/80626

Fouze, A. Q., & Amit, M. (2019). Ethnomathematics and Geometrical Shapes in Bedouin Women's Traditional Dress. *Creative Education*, *10*(07), 1539–1560. https://doi. org/10.4236/ce.2019.107112

Fraenkel, J. L., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education eighth edition* (8th ed.). Mc Graw Hill.

Kaiser, G., & Willander, T. (2005). Development of mathematical literacy: Results of an empirical study. *Teaching Mathematics and Its Applications, 24*(2–3), 48–60. https://doi.org/10.1093/teamat/hri016

Kemendikbud. (2020). *AKM dan implikasinya pada pembelajaran. Pusat Asesmen dan Pembelajaran Badan Penelitian dan Pengembangan dan Perbukuan Kementrian Pendidikan dan Kebudayaan.*

Kemendikbud. (2021). *Framework asesmen kompetensi minimum (AKM). Pusat Asesmen dan Pembelajaran, Badan Penelitian, Pengembangan dan Perbukuan, Kementerian Pendidikan dan Kebudayaan.*

Kemendikbudristek. (2023). *Framework asesmen kompetensi minimum (AKM). Pusat Asesmen Pendidikan Badan Standar, Kurikulum, dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi.*

Laksana, D. N. L. (2024). *Pengembangan media pembelajaran literasi dan numerasi berbasis budaya lokal untuk siswa SD kelas rendah* [Development of local culture-based literacy and numeracy learning media for lower grade elementary school students]. *JKTP: Jurnal Kajian Teknologi Pendidikan*, *7*(1), 12–23. https://doi. org/10.17977/um038v7i12024p012

Miftah, R. N., & Setyaningsih, R. (2022). *Pengembangan LKPD berbasis asesmen kompetensi minimum (AKM) pada materi geometri untuk meningkatkan*

kemampuan literasi numerasi [Development of student worksheets based on minimum competency assessment (AKM) in geometry to improve numeracy literacy skills]. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 11*(3), 2199. https://doi.org/10.24127/ajpm.v11i3.5780

Inayah, A. N. A., Nagari, G. P., Setiawan, K., & Anisah, N. (2022). *Kemampuan literasi numerasi untuk mengembangkan pemahaman konsep dalam pembelajaran matematika* [Numeracy literacy skills to develop conceptual understanding in mathematics learning]. *Himpunan: Jurnal Ilmiah Mahasiswa Pendidikan Matematika.*, *2*(2), 106.

OECD. (2023). *PISA 2022 assessment and analytical framework*. OECD. https://doi.org/10.1787/dfe0bf9c-en

Oktiningrum, W., & Hartono, Y. (2016). Developing PISA-Like mathematics task with indonesia natural and cultural heritage as context to assess students mathematical literacy. *Journal on Mathematics Education*, *7*(1), 1–10.

Popovic, G., & Lederman, J. S. (2015). Implications of informal education experiences for mathematics teachers' ability to make connections beyond formal classroom. *School Science and Mathematics*, *115*, 129–140.

Pusmendik. (2023). *Laporan hasil asesmen nasional tahun 2023: satuan pendidikan jenjang SMP*. Pusat Asesmen Pendidikan, Kemendikbudristek.

Ramadhani, R., Soeharto, S., Arifiyanti, F., Prahmana, R. C. I., Saleh, A., & Lavicza, Z. (2025). Assessing quality and biases in ethnomathematics-based numeracy worksheets: A Many-Facet Rasch Model analysis. *Social Sciences and Humanities Open, 12*. https://doi.org/10.1016/j.ssaho.2025.101736

Stephens, Max. (2009). *Numeracy in practice : teaching, learning and using mathematics*. Education Policy and Research Division, Department of Education and Early Childhood Development.

Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Bandung: Alfabeta.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. In *International journal of medical education.* (Vol. 2, pp. 53–55). https://doi.org/10.5116/ijme.4dfb.8dfd

Umbara, U., & Suryadi, D. (2019). Re-interpretation of mathematical literacy based on the teacher's perspective. *International Journal of Instruction*, *12*(4), 789–806. https://doi.org/10.29333/iji.2019.12450a

Wardi. (2019). *Kearifan lokal pemerihaan sapi dengan sistem ikat pindah pada lahan kering di kabupaten sigi sulawesi tengah* [Local wisdom in cattle raising using a tethering system on dry land in sigi regency, central sulawesi]. *Seminar Nasional Inovasi Teknologi Pertanian.*, 649.

Xu, B., Ma, X., Zhang, Y., & Wu, X. (2025). How does mathematical literacy affect creative thinking? Independent effects and differential impacts across proficiency groups. *Acta Psychologica, 260*. https://doi.org/10.1016/j.actpsy.2025.105509

Yusup, F. (2018). *Uji validitas dan reliabilitas instrumen penelitian kuantitatif* [Testing the validity and reliability of quantitative research instruments]. *Jurnal Tarbiyah: Jurnal Ilmiah Kependidikan*, *7*(1), 17–23.