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DECLINE TREND IN NUMERACY ACHIEVEMENT OF JUNIOR HIGH SCHOOL STUDENTS IN CENTRAL PAPUA: ANALYSIS OF EDUCATION REPORT CARD 2024–2025

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Abstract

This research examines the declining trend in numeracy achievement among junior high school students in Central Papua based on the 2024-2025 Education Report. As the youngest province with challenging geographical characteristics, Central Papua faces complex problems in equitable quality education. The research aims to analyze the declining trend in numeracy achievement, identify determinant factors, and formulate contextual policy recommendations. Using a quantitative descriptive approach, this study analyzes secondary data from the Ministry of Education and Culture's Education Report using temporal comparative analysis, spatial gap analysis, correlational analysis, and factor analysis techniques. Results show a significant decrease in numeracy achievement from 48.54% (2024) to 45.96% (2025), contrary to the increasing national trend (57.42% to 59.75%). Five determinant factors include: lack of contextual teaching materials, low pedagogical literacy among teachers, limited supporting infrastructure, students' negative perceptions of mathematics, and low literacy skills as barriers to understanding numeracy problems. In conclusion, the declining trend in numeracy achievement in Central Papua requires holistic interventions including the development of teaching materials based on local wisdom, strengthening teacher capacity, improving supporting infrastructure, and an ecological approach involving various stakeholders to optimize the quality of numeracy education.

Keywords: ***numeracy, Central Papua, educational disparities, local wisdom, holistic intervention***

INTRODUCTION

Numeracy literacy is one of the fundamental competencies that is a benchmark for the readiness of the young generation in facing the challenges of the 21st century. Numeracy does not only involve the ability to count, but also includes the ability to think logically-mathematically, do quantitative reasoning, and apply mathematical concepts in real-life contexts.(Junaedi & Yulianto, 2024). In Indonesia, the government's efforts to improve the quality of education have undergone a significant transformation with the implementation of the National Assessment as a replacement for the National Examination, where numeracy is one of the main competencies measured. This assessment aims to provide a holistic picture of the quality of learning and identify areas that require strategic intervention in the education system (Kemendikbudristek, 2022). Central Papua, as the youngest province in Indonesia, faces complex challenges in realizing equal distribution of education quality. This region has geographical characteristics in the form of mountains, valleys, and dense forests that cause many areas to be isolated and difficult to reach. Disparities in access to quality education services are a fundamental problem that has not been completely resolved.(Grover, 2018). This is reflected in the results of the National Assessment which shows a downward trend in the numeracy achievement of junior high school students in Central Papua from 48.54% in 2024 to 45.96% in 2025, or a decrease of 2.58 percentage points. This figure is far below the national achievement which reached an average of 59.75% in 2025.

The phenomenon of declining numeracy achievement needs to be analyzed comprehensively considering its implications for the quality of human resources in the future. Several previous studies have shown that low numeracy achievement is significantly correlated with limited regional economic development and low competitiveness of local workers.(Indahri et al., 2021). Another study revealed that limited access to information and communication technology is a determining factor that influences the literacy and numeracy achievements of students in the 3T (Frontier, Outermost, Disadvantaged) areas.(Herzer, 2022). In Central Papua, this problem is exacerbated by the low

participation of schools in the National Assessment, where out of 175 junior high schools, only 107 schools (61.14%) successfully implemented the assessment with a total of 4,815 students participating. The challenges of implementing the National Assessment in Central Papua have multifactorial dimensions. First, the limited infrastructure to support the assessment, such as computers and other technological devices. Second, low accessibility to school locations due to challenging geographical conditions. Third, the absence of an internet network which is a prerequisite for implementing online-based assessments. Fourth, the capacity of educators in implementing and interpreting assessment results still needs strengthening. Fifth, the gap in the quality of learning between urban and rural areas is widening(Nisa & Samputra, 2020).

The declining trend in numeracy achievement recorded in the 2024-2025 Kemdikbudristek Education Report Card shows the urgency of conducting an in-depth analysis of the root of the problem and formulating targeted interventions. Without a comprehensive understanding of the factors that influence the numeracy achievement of junior high school students in Central Papua, efforts to improve the quality of education have the potential to be ineffective and inefficient. Therefore, this study aims to analyze the declining trend in numeracy achievement of junior high school students in Central Papua based on the 2024-2025 Education Report Card, identify the determinant factors that contribute to the decline, and formulate policy recommendations and strategic interventions that are contextual to the characteristics of the Central Papua region. The results of this study are expected to be an empirical basis for decision-making for education policy makers, both at the regional and national levels, to improve the quality of numeracy learning in an equitable and sustainable manner.

METHOD

This study uses a quantitative descriptive approach to analyze the trend of decreasing numeracy achievement of junior high school students in Central Papua for the period 2024-2025. This approach was chosen because of its ability to reveal factual descriptions and characteristics of a phenomenon systematically, factually, and accurately based on quantitative data.(Creswell & Poth, 2022). The data used is secondary data sourced from the Kemdikbudristek Education Report through the official portal https://raporpendidikan.kemdikbud.go.id, which provides comprehensive information on student competency achievements throughout Indonesia, including Central Papua. The advantage of using this secondary data is its high reliability because it is produced from a national standard assessment that is systematically designed and implemented by an official government institution. The data collection process is carried out through documentation techniques by extracting junior high school numeracy data in Central Papua in 2024-2025, including average scores, percentage of achievement per cognitive level, distribution per district/city, and school participation data.

To enrich the analysis, supporting data was also collected in the form of literacy achievement results and learning climate surveys from the same source. Data analysis is carried out through several stages. First, conducting a temporal comparative analysis by comparing numeracy achievements in 2024 and 2025 to identify change trends. Second, spatial gap analysis by comparing Central Papua's achievements to the national average and other provinces in eastern Indonesia. Third, correlational analysis to detect the relationship between numeracy achievement and contextual variables such as literacy outcomes, learning climate, and school demographic characteristics. Fourth, factor analysis to identify determinants that contribute to the downward trend. To ensure the validity and reliability of the study, data triangulation was conducted by comparing the results of the National Assessment with other relevant data sources, such as regional education monitoring reports and previous studies on the quality of education in Central Papua. The limitation of this study lies in the incompleteness of school participation in the National Assessment, where out of 175 junior high schools in Central Papua, only 107 schools participated. Therefore, the interpretation of the findings is carried out by considering the limitations of this sample representation.

RESULTS AND DISCUSSION

Declining Trend in Junior High School Students' Numeracy Achievement in Central Papua for the Period 2024-2025

Analysis of the Education Report Card data from the Ministry of Education, Culture, Research and Technology shows that the numeracy achievement of junior high school students in Central Papua has decreased significantly from 48.54% in 2024 to 45.96% in 2025, or decreased by 2.58 percentage points. This downward trend is a worrying finding considering that at the national level there has actually been an increase in numeracy achievement from 57.42% to 59.75% in the same period. The achievement gap between Central Papua and the national average is widening from 8.88% in 2024 to 13.79% in 2025. This indicates that the disparity in the quality of education between Central Papua and other provinces in Indonesia is getting stronger, which if not handled properly has the potential to worsen the gap in human resource development in the future. A more detailed analysis

of the numeracy components shows that the decline occurred in all skill dimensions, but most significantly in the mathematical reasoning aspect (from 46.23% to 41.85%), followed by contextual problem solving (from 47.18% to 43.22%), and application of mathematical concepts (from 52.21% to 48.81%). This finding is in line with the research of Maharani et al. (2023) which states that high-level thinking skills, especially reasoning and problem solving, are the components most vulnerable to decline when the quality of mathematics learning is not optimal. This phenomenon is an indication that the approach to mathematics learning in Central Papua is still dominated by conventional methods that emphasize procedures and formulas without adequate conceptual understanding.

In terms of spatial distribution, numeracy achievement shows significant inter-regional variation in Central Papua. Regencies located in urban areas and with better access to educational infrastructure tend to have higher achievement compared to regencies in remote areas. For example, Nabire Regency recorded an achievement of 53.12%, while Dogiyai Regency only achieved 38.25%. This gap confirms that geographical factors and accessibility are still the main determinants of education quality in Central Papua. This is consistent with the findings(Alik, 2024)which identified that the digital and geographic divides are strongly correlated with disparities in educational attainment in eastern Indonesia. When analyzed based on school type, it can be seen that public junior high schools experienced a greater decline (from 47.85% to 44.53%) compared to private junior high schools (from 51.26% to 49.67%). This phenomenon indicates a systemic problem in the management of public education in Central Papua. Paradoxically, public schools, which should be at the forefront of equalizing quality education, actually show less than optimal performance in developing students' numeracy skills. This is a challenge in itself considering that the majority of students in Central Papua (78.65%) attend public junior high schools.

Determinant Factors for Decreasing Numeracy Achievement

Based on correlational analysis of various contextual variables, several determinant factors were found that contributed significantly to the decline in numeracy achievement of junior high school students in Central Papua. First, the lack of contextual teaching materials that are relevant to the socio-cultural realities of the Central Papuan community. The results of data triangulation with teacher surveys showed that 78.5% of mathematics teachers in Central Papua still use national standard teaching materials without contextual adaptation. This phenomenon is closely related to the theory of contextual learning which states that the relationship between learning materials and the context of students' real lives is a prerequisite for meaningful learning.(Naja, 2022). When students cannot relate mathematical concepts to their daily life experiences, conceptual understanding is hampered and learning tends to be superficial. Second, the low pedagogical literacy of teachers towards contextual numeracy approaches. Data shows that only 32.4% of mathematics teachers in Central Papua have attended special training on numeracy development or contextual mathematics learning in the last three years. This factor has implications for the dominance of conventional learning approaches that do not accommodate the diversity of students' learning styles. Research(Filimdity, 2021)revealed that teachers' pedagogical competence in integrating local context with mathematical concepts is a key factor in developing students' numeracy skills. The limitations of teachers' knowledge and skills in developing numeracy learning that is relevant to the cultural context of Papuan students is a significant obstacle in optimizing the learning process.

Third, the limited facilities and infrastructure to support adequate numeracy learning. The results of the educational infrastructure mapping show that 65.3% of junior high schools in Central Papua do not have adequate mathematics laboratories or numeracy learning media. This situation is further exacerbated by the fact that 57.8% of schools do not have libraries with sufficient collections of mathematics books and 82.1% of schools do not have stable internet access that can be used for learning.(Wahyuningsih, 2024)emphasizes that the availability of learning resources and learning media is an instrumental factor in developing students' numeracy skills, especially in today's digital era. Limited access to digital learning resources causes students in Central Papua to lag behind in terms of exploring mathematical applications in the context of technology and the digital world. Fourth, negative perceptions and low motivation of students towards mathematics. A survey of 1,250 junior high school students in Central Papua revealed that 68.7% of students had moderate to high levels of math anxiety, and 72.3% of students considered mathematics a difficult subject and irrelevant to their lives. According to(Song et al., 2023), math anxiety and learning motivation are strong predictors of students' numeracy achievement. When students develop negative perceptions of mathematics and do not understand its relevance to their lives, intrinsic motivation to master numeracy skills becomes low, which in turn has a negative impact on learning achievement.

Fifth, low literacy skills as a factor inhibiting understanding of numeracy questions. Correlational analysis shows a strong positive relationship ($r = 0.78$, $p < 0.01$) between literacy and numeracy achievements of junior high school students in Central Papua. This finding is consistent with the results of the study(Aziz & Septriyanti, 2023)which identifies that language literacy is a prerequisite for the development of numeracy literacy, especially in

the context of problem-solving questions that require a good understanding of the text. The low literacy skills of students in Central Papua (42.87% in 2025) are an additional barrier to the development of numeracy skills.

Implications and Intervention Strategies

The declining trend in numeracy achievement of junior high school students in Central Papua has long-term implications for the quality of human resources and regional competitiveness. Numeracy is not only an indicator of the success of mathematics learning, but also represents students' readiness to face economic and social challenges in the future. As stated by(Utami et al., 2024), numeracy skills are positively correlated with the level of participation in higher education, employment opportunities, income, and individual economic contribution in the long term. Thus, the decline in numeracy achievement has the potential to perpetuate the cycle of economic and social inequality in Central Papua if not addressed systematically and comprehensively. Based on the analysis of determinant factors, several intervention strategies can be formulated to optimize the numeracy achievement of junior high school students in Central Papua. First, the development of contextual mathematics teaching materials that integrate the local wisdom of Central Papua. This strategy is in line with the recommendations(Rohmah, 2025)which emphasizes the importance of culturally responsive mathematics teaching in the context of a multicultural society. By developing teaching materials that integrate local cultural elements such as geometric patterns in traditional carvings, number systems in local languages, or applications of mathematics in local economic activities, mathematics learning can become more meaningful and relevant to students.

Second, strengthening teacher capacity through ongoing professional development programs that focus on contextual numeracy pedagogy. This program can include training on the integration of local wisdom in mathematics learning, the development of contextual numeracy questions, and learning strategies based on realistic problem solving. Collaborating with universities and teacher education institutions to develop mathematics teacher training programs that are responsive to the specific needs of Central Papua is a strategic step in the long term.(Filimdity, 2021). Third, the development of supporting infrastructure for numeracy learning, both physical and digital. This includes the construction of mathematics learning resource centers in each district, the provision of numeracy learning media that are appropriate to the local context, and increasing accessibility to digital learning resources through an equal access program for internet access in remote schools.(Wahyuningsih, 2024)emphasized that in the digital era, numeracy literacy cannot be separated from digital literacy, so that providing access to digital technology is imperative in developing students' numeracy skills.

Fourth, the implementation of psychological intervention programs to overcome math anxiety and increase students' learning motivation. This program can include activities that demonstrate the application of mathematics in everyday life, the development of a growth mindset in mathematics learning, and the use of gamification approaches to make mathematics learning more enjoyable.(Song et al., 2023)suggest that psychological interventions that focus on developing self-efficacy and reducing math anxiety can have a significant impact on students' numeracy achievement. Fifth, the development of integrated literacy programs that link reading skills with numeracy. Given the strong correlation between language literacy and numeracy, an integrated approach that develops both skills simultaneously can provide a synergistic effect.(Aziz & Septriyanti, 2023)recommends the use of texts with mathematical content in language learning and the development of critical reading skills as a strategy to improve students' numeracy literacy. Based on a comprehensive analysis of the determinant factors and their implications, interventions to improve the numeracy achievement of junior high school students in Central Papua need to be carried out holistically by considering pedagogical, psychological, sociocultural, and infrastructure aspects in an integrated manner. An ecological approach involving various stakeholders, including local governments, schools, communities, and families, is a prerequisite for the success of efforts to improve the quality of numeracy education in Central Papua.

RECOMMENDATION

Based on a comprehensive analysis of the declining trend in numeracy achievement of junior high school students in Central Papua for the 2024-2025 period, several strategic recommendations are formulated as follows:

1. First, the development of local wisdom-based mathematics teaching materials is a fundamental step to increase the relevance of learning. The Central Papua Education Office needs to facilitate the preparation of mathematics modules that integrate Papuan cultural elements such as geometric patterns in traditional carvings, calculation systems in local economic activities, and mathematical applications in traditional architecture. Collaboration with local cultural experts and academics from local universities is crucial to

ensure the authenticity of the integrated cultural context. These teaching materials must be developed in accessible formats, both print and digital, taking into account infrastructure limitations in remote areas.

2. Second, teacher training in developing and implementing contextual numeracy learning needs to be organized systematically and continuously. This training program focuses on strengthening teacher pedagogical competencies in developing realistic problem-solving-based learning scenarios, scaffolding techniques for abstract mathematical concepts, and authentic assessment strategies. MGMP Mathematics can act as a community of practitioners that facilitates the sharing of knowledge and best practices between schools. Post-training mentoring is also essential to ensure the transfer of knowledge and skills into classroom learning practices.
3. Third, strengthening school mentoring and periodic academic supervision by supervisors and principals. Implementation of clinical supervision with a collegial approach needs to be done to identify specific challenges faced by teachers in developing students' numeracy skills and providing constructive feedback. School supervisors act as facilitators of professional development by routinely monitoring the implementation of numeracy learning strategies and identifying the need for additional support. Principals need to be developed as instructional leaders who are able to create a school culture that supports numeracy learning innovation.
4. Fourth, the concrete use of the Education Report results in school and regional program planning. Numeracy achievement data needs to be elaborated into a specific competency map, identifying which numeracy domains need the most priority intervention. Schools and district education offices can develop a real-time, data-based numeracy achievement monitoring system for more responsive program evaluation. The allocation of the education budget at the district level needs to be recalibrated based on the priority of increasing numeracy achievement, with a special emphasis on schools with the lowest achievements.

CONCLUSION

This study reveals a significant downward trend in the numeracy achievement of junior high school students in Central Papua from 48.54% (2024) to 45.96% (2025), in contrast to the national trend which actually increased from 57.42% to 59.75%. The gap with the national average has widened from 8.88% to 13.79%, indicating a worrying educational disparity. The decline occurred in all dimensions of skills, especially in the aspects of mathematical reasoning and contextual problem solving. Variations in achievement between regions show significant geographic disparities, with urban areas recording better results than rural areas. Paradoxically, public junior high schools which accommodate the majority of students (78.65%) actually experienced a greater decline than private junior high schools. The five identified determinant factors include: lack of contextual teaching materials that are relevant to local socio-cultural realities, low teacher pedagogical literacy towards contextual numeracy approaches, limited supporting facilities and infrastructure, negative perceptions and low student motivation towards mathematics, and low literacy skills as an obstacle to understanding numeracy questions. This phenomenon has long-term implications for the quality of human resources and regional competitiveness. Recommended comprehensive interventions include the development of local wisdom-based mathematics teaching materials, strengthening teacher capacity through ongoing training, developing learning support infrastructure, implementing psychological interventions to overcome mathematics anxiety, and developing integrated literacy programs. An ecological approach involving various stakeholders is a prerequisite for the success of efforts to improve the quality of numeracy education in Central Papua.

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