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CONTEXTUAL LEARNING MODEL FOR IMPROVING LITERACY AND NUMERACY IN COASTAL PRIMARY SCHOOLS

MODEL PEMBELAJARAN KONTEKSTUAL UNTUK MENINGKATKAN LITERASI DAN NUMERASI SISWA DI SEKOLAH DASAR WILAYAH PESISIR

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Abstract

Low literacy and numeracy scores at SDN 021 Galang require concrete intervention. This study aims to examine the impact of implementing a contextual learning model on students' literacy and numeracy skills at SDN 021 Galang. This study employed an experimental design with a pretest and posttest control group involving a sample of 14 students. The instruments consisted of literacy and numeracy tests validated by experts. Data analysis was conducted using normality testing and a paired-samples t-test. The results revealed significant improvements in literacy and numeracy following the implementation of contextual learning strategies, including extensive reading, reading corners, storytelling, numeracy snakes and ladders, and outdoor learning. Compared to conventional learning, the contextual learning model proved more effective in building foundational skills through approaches relevant to students' daily lives. This model not only impacts academic achievement but also enhances students' motivation, engagement, and learning independence in resource-limited environments.

Keywords: *Literacy, Numeracy, Contextual Learning, Coastal Schools*

Abstrak

Rendahnya nilai literasi dan numerasi pada satuan pendidikan SDN 21 Galang perlu upaya penyelesaian yang konkret. Tujuan penelitian ini untuk mengetahui dampak implementasi model pembelajaran kontekstual terhadap kemampuan literasi dan numerasi siswa di SDN 021 Galang. Penelitian ini menggunakan desain eksperimen pretest and posttest control group dengan sampel 14 siswa. Instrumen berupa tes literasi dan numerasi yang telah divalidasi oleh ahli. Analisis data dilakukan melalui uji normalitas dan paired sample t-test. Hasil penelitian menunjukkan peningkatan signifikan dalam kemampuan membaca dan berhitung setelah penerapan strategi pembelajaran kontekstual, termasuk membaca ekstensif, pojok baca, mendongeng, permainan ular tangga berhitung, dan pembelajaran di luar ruangan. Dibandingkan dengan pembelajaran konvensional, model pembelajaran kontekstual terbukti lebih efektif dalam membangun keterampilan dasar melalui pendekatan kontekstual yang relevan dengan kehidupan siswa. Model ini tidak hanya berdampak pada capaian akademik, tetapi juga meningkatkan motivasi, keterlibatan, dan kemandirian belajar siswa di lingkungan terbatas.

Kata Kunci: *Literasi, Numerasi, Pembelajaran Kontekstual, Sekolah Pesisir*

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1. Introduction

The two fundamental pillars of 21st-century education that determine the quality of life of people in a nation are literacy and numeracy, not only the ability to read and write, but also include the ability to understand, analyze and critically apply information in everyday life. Meanwhile, numeracy encompasses more than just the ability to calculate; it also involves reasoning mathematically, solving problems, and relating mathematical concepts to real life, which are essential for addressing increasingly complex global challenges (OECD, 2019).

Literacy and numeracy are essential basic skills that are important components of a student's education. Both are prerequisites for developing students who are aware of advances in information and can make rational decisions across social, economic, and cultural contexts. The importance of mastering basic concepts in elementary school is also emphasized in the curriculum, which shows that literacy is not only about reading but also the fundamental ability to comprehend the substance of learning (Mizaniya, 2020).

However, recently, the literacy and numeracy skills of Indonesian students have been a cause for concern. According to PISA 2022, around 70% of Indonesian students do not meet the minimum competency level in reading, writing, or mathematics, a figure above the OECD average of 23% (OECD, 2023). The lack of basic skills among students shows that the problem of literacy and numeracy in Indonesia is not only individual or local in nature, but also systemic, hindering the long-term development of human resources. This condition is not only found in big cities but also in disadvantaged, frontier, and outermost rural and urban areas (3T). The lack of digital literacy, lack of access to quality educational materials, shortage of qualified teachers, and the dominance of conventional learning in classrooms make this problem even more complex. The ideal form of education serves as a tool for social mobility and also reflects structural and geographical instability (Lubis, Daffa, Siregar, & Nisa, 2026; Maharani, Putri, Kurniawati, Perkasa, & Rifa'i, 2025).

One of the schools targeted in this study was SDN 021 Galang, Batam, located in a coastal area. This school faced challenges typical of the Riau Islands border region, with inadequate facilities and low levels of student literacy and numeracy. The lack of access to technology, cramped library space, irrelevant book collections, monotonous learning methods, and a lack of educational media are indicators of the urgency of intervention at this school. This study shows the results of the pretest on literacy and numeracy of grade V students at SDN 021 Galang. Among the 14 students who took the test, only 35% answered the literacy questions correctly, and only 26% answered the numeracy questions correctly.

Table 1. Initial Observation Results of Grade V Students at SDN 021 Galang

No.	Aspect	Competency	Percentage of Correct Answers
1.	Literacy	Includes the ability to find explicit information, infer messages or ideas, identify character problems, compare text content, explain character issues, assess the appropriateness of illustrations with the text, and determine the relevance of facts or data.	35%

No.	Aspect	Competency	Percentage of Correct Answers
2.	Numeracy	Includes the ability to solve simple equations using basic arithmetic operations, recognize the properties of two-dimensional and three-dimensional shapes, calculate the area and perimeter of shapes, use whole number operations including squares and prime numbers, understand four-digit numbers, present and explain data in various forms, and determine length, weight, and appropriate units of measurement.	26%

The low literacy achievement results indicate that most students still have difficulty understanding simple reading material, finding explicit information, and connecting the text's content to everyday life. On the other hand, low numeracy scores indicate a weak understanding of basic arithmetic, units of time, and simple mathematical reasoning. Compared with literacy and numeracy standards at the national and international levels, students at this school are still unable to meet the minimum competencies expected.

This condition highlights the need for learning interventions that can bridge the gap between expected competencies and students' actual achievements. One relevant approach is the contextual learning model. The contextual learning model emphasizes the relationship between learning materials and students' real-life contexts, making the knowledge gained more applicable and meaningful (Prasetyo, Warawu, & Pratama, 2025). The principles of the contextual learning model include constructivism, discovery, inquiry, learning communities, modelling, reflection, and authentic assessment, which enable students to develop understanding through independent study and social interaction (Ali & Julaihah, 2023). This application of the contextual learning model, combined with a scientific approach, is also very effective at bridging learning materials with students' real experiences, thereby increasing students' enthusiasm for learning, even in environments with limited access (Rahmaini, 2020).

In this study, the contextual learning model was applied through strategies tailored to students' needs in coastal areas. These strategies included a reading corner to build a culture of literacy among students, reading a lot and storytelling to improve reading comprehension, a numeracy snake and ladder game to practise arithmetic skills in a fun way, connecting mathematical concepts with the surrounding environment through field activities, and the use of interactive media for digital literacy. None of these strategies stands alone but are designed as a form of implementation based on the principles of the contextual learning model.

This research is important not only for the practical evaluation of learning interventions but also for advancing the literature on learning intervention models in resource-limited settings. The results of this study are expected to serve as a useful practical reference for educational transformation, particularly in coastal areas, and as an

important contribution to the literature on interventions to improve literacy and numeracy in resource-limited settings.

2. Research Method

This research was conducted at SDN 021 Galang, Galang District, Batam City, which is one of the outermost regions. This research used an experimental design with a pretest and posttest control group. Thus, the methodology constituted a quasi experimental design, as group allocation was not randomized but based on existing classroom conditions. This design was used to determine the effect of the contextual learning model on improving students' literacy and numeracy.

This study aims to describe the implementation of the contextual learning model and analyze its impact on improving student literacy and numeracy in primary schools in coastal areas. The research subjects were 14 fifth-grade students at SDN 021 Galang, divided into two groups: an experimental group that received a contextual learning intervention and a control group that followed conventional learning. The limited number of subjects was adjusted to the available population at the research site. The research instruments were literacy and numeracy test questions compiled based on basic competency indicators in the 2013 curriculum and the Pancasila student profile.

The content validity of the instrument was tested through a validation process conducted by experts in mathematics and literacy education. Content validity was assessed by a panel of three experts through expert evaluation, using criteria covering instructions, construction, content, and language. Expert validation is a commonly used approach in educational research to ensure that the instrument's content aligns with the competencies being measured.

Data collection was conducted through literacy and numeracy tests administered before and after the contextual learning model treatment. The data were analyzed using a paired samples t-test to assess the significance of improvements in students' abilities, with a separate test performed for each group to compare pretest and posttest scores. A normality test was conducted beforehand to ensure the data met the requirements for parametric testing.

3. Results and Discussion

3.1 Results

This study focused on assessing improvements in students' literacy and numeracy skills through the application of contextual learning models. The findings presented in this section include descriptive statistical analysis (mean, median, mode, standard deviation, minimum score, and maximum score), graphical distribution through histograms, normality test using the Kolmogorov-Smirnov and Shapiro-Wilk test, and hypothesis testing using the paired sample t-test to determine the significance of the difference between pretest and posttest scores.

3.1.1 Literacy

Student literacy was analyzed using descriptive statistics, the data are presented in table 2.

Table 2. Descriptive Statistics of Literacy

No.	Descriptive Statistics	Pretest	Posttest
1	Mean	34.64	50.00
2	Median	35.00	52.50
3	Mode	35.00	25.00
4	Std. Dev	8.65	20.85
5	Min	20.00	25.00
6	Max	50.00	90.00

The results of the descriptive analysis show that students' literacy achievement on the pretest had an average score of 34.64, a median of 35.00, a mode of 35.00, and a standard deviation of 8.65. This finding indicated that most students were in the low category with a relatively uniform concentration of achievement. After implementing contextual learning, literacy scores increased, with an average of 50.00 and a median of 52.50. However, the posttest mode decreased to 25.00, while the standard deviation rose dramatically to 20.85.

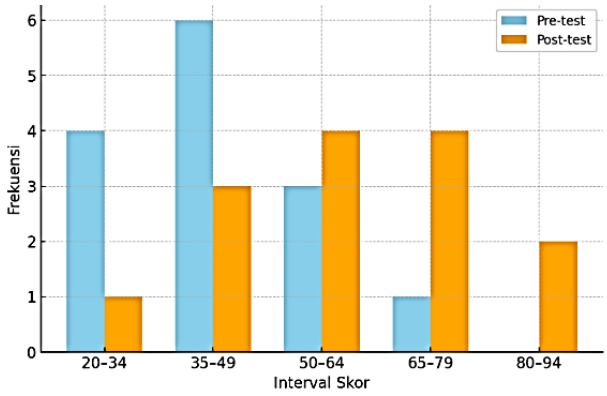


Figure 1. Pretest and Posttest Literacy Histogram

This condition shows an increase in achievement among the majority of students, but small groups remain in the low category, making the data distribution more scattered. Visually, the histogram shows a rightward shift in the distribution, confirming an improvement in student achievement despite greater variation.

3.1.2 Numeracy

The results of the numeracy assessment are presented as descriptive statistics in table 3.

Table 3. Descriptive Statistics for Numeracy

No.	Descriptive Statistics	Pretest	Posttest
1	Mean	26.07	43.57
2	Median	22.50	42.50
3	Mode	20.00	35.00
4	Std. Dev	10.95	15.98
5	Min	10.00	15.00
6	Max	50.00	65.00

In terms of numeracy, the pretest results showed an average of 26.07, a median of 22.50, a mode of 20.00, and a standard deviation of 10.95. These results indicated that most students still had difficulties with basic numeracy skills. After using the contextual learning model, the average score increased to 43.57, the median to 42.50, and the mode shifted to 35.00. The standard deviation also increased to 15.98, indicating greater variation among students, but the distribution of scores shifted to a higher category overall.

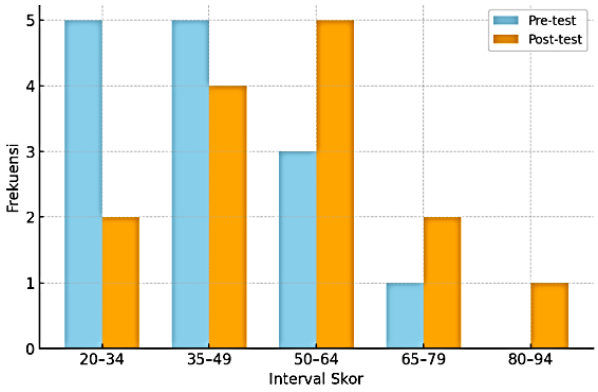


Figure 2. Pretest and Posttest Numeracy Histogram

The numeracy histogram also shows a rightward shift in the distribution, indicating a significant improvement in students' numeracy skills after context-based learning.

3.1.3 Normality Test

Table 4 presents the results of the normality analysis for students' literacy and numeracy skills.

Table 4. Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
pretest_conventional literacy	0.16	14	0.20*	0.95	14	0.54
posttest_contextual literacy	0.18	14	0.20*	0.92	14	0.22
pretest_conventional numeracy	0.22	14	0.07	0.89	14	0.09
posttest_contextual numeracy	0.13	14	0.20*	0.94	14	0.48

*.This is a lower bound of the true significance
a. Lilliefors Significance Correction

The Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that the significance values for all variables are > 0.05 for both the pretest and posttest of literacy and numeracy. This finding indicates that the data are normally distributed, so the paired samples t-test can be used.

3.1.4 Paired Sample t-test for Literacy and Numeracy

A paired sample t-test was used to assess the significance of differences between pretest and posttest scores for literacy and numeracy skills. The complete statistical results are presented in table 5.

Table 5. Paired Sample t-test for Literacy

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std.Deviation	Std. Error Mean	Lower	Opper	t	df	Sig. (2-tailed)
Pair 1	Pretest_Literacy Posttest_Literacy	-15.36	18.96	5.07	-26.30	-4.41	-3.03	14	0.01
Pair 2	Pretest_Numeracy Posttest_Numeracy	-17.50	16.61	4.44	-27.09	-7.91	-3.94	14	0.00

The test results show a t-value of -3.03 with a significance level of 0.01 (< 0.05). With an average difference of -15.36, the posttest literacy scores are significantly higher than the pretest scores.

In numeracy, the t-value of -3.94, with a significance level of 0.00 (< 0.05), indicates a significant difference between the pretest and posttest. The average difference of -17.50 shows a consistent improvement in numeracy achievement.

3.2 Discussion

The increase in the mean literacy score from 34.64 to 50.00 and the increase in the median (35.00 to 52.50) indicate that the application of the contextual learning model promotes progress in reading and text comprehension skills in the majority of students. The change in mode and increase in SD posttest indicate that although many students improved, some did not respond optimally to the intervention. This phenomenon warrants follow-up with differentiation strategies to accommodate individual student needs (Andarika & Rofiki, 2024).

The descriptive results of this study indicate that students demonstrated the greatest improvement in the ability to find explicit information, which is easier to train through activities such as reading aloud, reading corners, and storytelling. This result is consistent with studies showing that contextual learning models improve reading comprehension through contextual relevance and real-life activities (Sambuno & Sofyan, 2024).

In the context of coastal schools, which often lack reading materials and facilities, the contextual learning model allows the use of local contexts as sources of reading and discussion materials. This approach not only increases student engagement but also makes the text more relevant to students, thereby accelerating the acquisition of basic literacy skills. However, higher level interpretive skills still require further guidance (Nugraha & Juniayanti, 2024). To address low modes among some students, a differentiated approach is recommended, such as remedial lessons tailored to the local context, peer tutoring, and reflective writing assignments that require summarizing or rewriting content to systematically train interpretive skills (Khulisoh, 2022).

The increase in the mean numeracy score from 26.07 to 43.57 and the shift in the mode from 20.00 to 35.00 indicate a real gain in basic numeracy skills among most students. However, the increase in standard deviation indicates differences in ability

between students after the intervention. Activities such as numeracy snakes and ladders (repeated arithmetic operations in a competitive setting) and class outings (measuring net length, counting catches, estimating tide times) provide concrete experiences that facilitate understanding of abstract mathematical concepts (Aziza, Syaharudddin, Mandailina, & Abdillah, 2024). The results of the normality test using the Shapiro-Wilk test indicate that all data are normally distributed (sig. > 0.05), so a paired t-test can be used as an inferential test (Putri, Ahman, Hilmia, Almaliyah, & Permana, 2023; Wahyudi, Idris, & Abidin, 2023).

Contextual problem-solving requires integrating more complex representations, reasoning, and metacognitive strategies. Although CTL provides a real context, the development of these abilities requires repeated practice at gradually increasing levels of complexity, as well as authentic assessment that provides diagnostic feedback. This principle is also included in Realistic Mathematics Education (RME) (Wahyuni & Yolanda, 2017). It is recommended to strengthen community-based project learning (contextual project-based learning) that combines the stages of problem posing → modelling → solution → reflection; as well as the integration of process assessment rubrics so that students receive step-by-step guidance towards greater problem solving skills (Ramadhanti, Sukmanasa, & Imaniah, 2023).

Overall, this study's results confirm that the contextual learning model is effective in improving students' literacy and numeracy skills in coastal schools. Significant improvements in achievement, both descriptively and inferentially, indicate that the contextual learning model can address the challenges of low literacy and numeracy often found in areas with limited educational resources. The strategies implemented, such as reading corners, reading a lot, storytelling, numeracy snakes and ladders, and outing classes, not only provide enjoyable learning experiences but are also relevant to the daily lives of coastal students. Thus, the contextual learning model not only improves academic achievement but also active engagement, learning motivation, and students' independence in building knowledge (Rafzan, Rizal, & Roswati, 2024).

4. Conclusion

The study's results indicate that the contextual learning model significantly improves the literacy and numeracy of primary school students in coastal areas. The increase in literacy scores shows that contextual learning model strategies, such as reading a lot, reading corners, and storytelling, can build more meaningful reading comprehension than conventional approaches that tend to be teacher-centred. Similarly, the increase in numeracy indicates that contextual activities such as numeracy snakes and ladders and class outings are effective in developing students' calculation and mathematical reasoning skills. Compared to conventional learning, which is abstract and less relevant, the contextual learning model presents mathematics as part of students' real experiences, making it easier to understand and apply. Overall, the contextual learning model not only improves academic achievement but also encourages active engagement, learning motivation, and student independence in building knowledge. These findings confirm that the contextual learning model is a relevant strategic approach to addressing educational challenges in coastal areas and supporting the achievement of inclusive and quality education.

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