

## Introduction of Numeration Literacy Skills-Oriented Educative Games Through the Campus Teaching Program

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### ABSTRACT

The problem of understanding the concept of multiplication at the primary school level is a significant challenge that can hinder students' education if not addressed. Besides, literacy culture needs special attention because many students still need help in reading activities due to a lack of interest. This is due to the perception that reading is boring and the need for more support from the environment, including parents. This article discusses introducing educational games oriented towards numeracy literacy skills in fifth-grade students of SD Negeri 13 Kota Sorong through a campus teaching program. There are four stages in implementing the program: Situation Analysis/Partner Problem Study (Pre-Test), Preparation and Creation of Educational Games, Implementation/Introduction of Educational Games, and Program Implementation Results (Post-Test). The data were from the Campus Teaching Program Batch 7 using direct observation and interviews. Then, direct observation of the teaching and learning process is also carried out to determine students' competence during this program. Based on the pre-test and post-test of the class Minimum Competency Assessment (AKM) conducted at the beginning and end of the activity, data obtained from students who experienced an increase in literacy as many as eight people (50%) remained as many as three people (18.75%). They decreased by five people (31.25%). Meanwhile, for numeracy, the number of students who experienced an increase was nine people (56.25), as many as one person (6.25%), and those who experienced a decrease were six people (37.5%). The results showed that the educational game improved some students' literacy and numeracy skills, although some experienced a decline in both skills.

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## INTRODUCTION

Education is a process of transferring knowledge from one generation to the next by preparing the younger generation to face the challenges of globalization and the digital era (Wildan, Suherman, & Rusdiyani, 2023). In addition, current learning models increasingly combine various media, such as visual, audio, and audiovisual, to increase student interest and understanding of learning materials. Learning in schools should be interactive, inspiring, and fun, encouraging students to actively participate and develop creativity and independence following talents, interests, and individual development (Wijaya & Andriyono, 2020; Setyo, 2019; Trisnawati et al., 2020). It is essential to prepare students with relevant skills to compete in the world of work, including math subjects that often cause fear and dislike (Wulandari & Sagita, 2011). Mathematics is often tricky because of formulas, numbers, and problems requiring extra thinking. However, it is essential in the development of science and technology, as well as in improving human resources at all levels of education. The main challenge for students lies in multiplication operations, which, if not addressed early on, can be an obstacle to their development (Leby, Margo Irianto, Yuniarti, Arie Anang Setyo, Mulyati). Mathematics needs to be made more interesting so that students feel confident and able to understand concepts such as multiplication. By utilizing educational games, teachers can make learning more interactive and fun to improve students' understanding of mathematics (Wirza et al., 2023; Hamzah & Widodo, 2021; Ulfa, 2019).

Mastering literacy and numeracy is essential in primary education. Those skills help individuals to access knowledge and information and be active in social and work life. In the era of globalization, the ability to read, write, understand information, and solve mathematical problems is indispensable to adapting to technology, innovating, and making good decisions (Waldi et al., 2022; Khan et al., 2023; Fitriana & Ridlwan, 2021). Literacy among primary school students is crucial as many have difficulty reading and writing due to a lack of interest and support from the environment (Ardiny et al., nd). By using more interactive teaching methods, such as age-appropriate storybooks and parental support, schools can build a strong literacy foundation for students to become critical and effective learners.

The Campus Teaching Program is a government effort to improve education in Indonesia by involving students directly in the teaching and learning process in elementary schools. Field supervisors guide students to create interactive and fun learning with a focus on improving students' literacy and numeracy skills (Iriawan & Saefudin, 2021; Muyassaroh et al., 2022). One of the latest innovations in education is using educational games to make learning more exciting and fun for students. It aims to improve students' ability to work together, problem-solving, and numeracy literacy. Conventional learning methods, such as counting operations, are often less effective in teaching math concepts (Mulyono & Setyo, 2019). In this case, the teaching campus is an ideal platform to implement this innovative method by engaging students, teachers, and schools in improving literacy and numeracy, especially in the context of multiplication at the primary school level.

## METHOD

This community service activity occurred from February 26 to June 16, 2024, at SD Negeri 13 Kota Sorong. The data were from the Campus Teaching Program Batch 7, which aimed to improve students' numeracy literacy skills. The primary data is obtained from interviews with teachers and students, as well as students who participate in the program at the school. Data collection techniques included direct observation and interviews. In addition, direct observation of the activities carried out and students' competencies during the program is also conducted. As the implementers of the activities, we conducted observations and interviews and summarized the things found. During the program, we observe the learning process, the interaction between teachers and students, and how students respond to the learning methods. This observation aims to determine the condition of the class, students'

involvement, and the effectiveness of the learning method in improving their numeracy literacy skills. This activity was conducted using four activity methods presented in the diagram below.

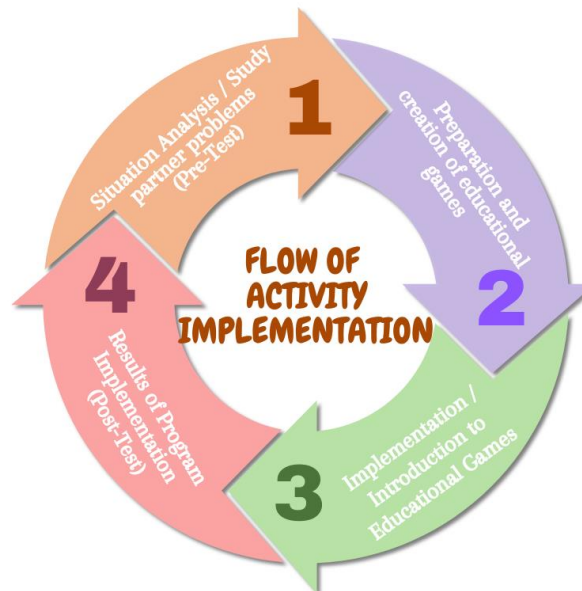


FIGURE 1. Activity Implementation Flow

1. Situation Analysis/Partner Problem Review (Pre-Test)  
At this stage, students' basic literacy and numeracy skills are observed for a week, followed by a pre-test to determine students' initial abilities. This test involved 16 students who filled in the data using the prepared participant cards.
2. Preparation and Creation of Educational Game  
After the pre-test, an educational game was designed to improve the ability of students with low scores. This stage involved designing the program and creating the program design with the team at the school.
3. Implementation/Introduction of Educational Game  
At this stage, the implementation of educational games for fifth-grade students explains how to play and the purpose of each game. This program is implemented twice a week, every Friday and Saturday.
4. Program Implementation Results (Post-Test)  
After the program started, we received positive responses from more active and enthusiastic students. A post-test was conducted to measure the improvement of their abilities and determine the final results after participating in the program.

## RESULT AND DISCUSSION

### Situation Analysis/Review of Partner Problems

In the first week of the assignment, the campus teaching team conducted observations to understand the school's needs related to literacy and numeracy. They also conducted a pre-test on 16 class students to evaluate their basic literacy and numeracy skills. The results showed that some students scored low, indicating the need for a skills improvement program. It is important because each child has different character and intellectual abilities, which can affect their academic performance (Indah, Saputro, &

Sundari, 2020; Fatimah, Wirnawa, & Dewi, 2020). Apart from the pre-test results, based on observations made at SD Negeri 13 Sorong City, it was found that students have difficulty in multiplication arithmetic operations due to several significant factors. First is the lack of basic understanding of multiplication, where many students need help understanding that multiplication is repeated addition, as described in Dwiyono & Tasik (2021). For example, they may assume that "3×4 equals 4×3" based only on the result without conceptually understanding that the two multiplications differ in the order of addition. The second factor is the limitation in mastering multiplication tables, Musa'ad et al. (2023), Setyo (2023). Students who have not mastered multiplication tables tend to spend more time and experience more errors when solving multiplication operations. The third factor is that monotonous and uninteresting teaching approaches can reduce students' overall interest in mathematics (Musa'ad et al., 2023). This approach uses lectures and practice problems, making students bored and less motivated. In contrast, methods that involve educational games, props, or interactive activities are more effective in increasing students' interest and skills in mathematics.

Furthermore, literacy skills, namely reading and writing, are basic skills that are important for students to have from an early age for daily life and competition in the 21st century. Teachers are expected to teach with exciting methods and continue to develop students' potential. The use of digital teaching materials has proven effective in facilitating the learning process and improving students' literacy skills (Setyo et al., 2022; Lailam et al., 2022; Rachmawati et al., 2022; Setyo et al., 2023). Meanwhile, low literacy skills among students are caused by several factors. The first factor is the need for more interest in reading. Many students are not interested in reading because they prefer playing games or watching television. They find reading uninteresting and unpleasant, so they avoid books and texts important for improving literacy. The second factor is the perception that reading is boring. Students perceive reading as monotonous and tedious, especially if the material could be more exciting or easier to understand. Learning focusing on formal texts without variety makes students feel burdened and unmotivated. Uncreative teaching methods exacerbate this situation. The next factor is the need for more environmental and parental support. Support from parents and access to reading materials are crucial to forming a reading habit. Many parents must provide time or opportunities for their children to read at home, and an unsupportive environment, such as a lack of libraries, also hinders students' literacy development. Without adequate support, it is difficult for students to develop optimal literacy skills.

### **Preparation and Creation of Educational Games**

After conducting a pre-test on sixteen students, we found that some students had low scores in literacy and numeracy. Therefore, the teaching team at the college designed an educational game program to improve their skills. The team was creating two activities for numeracy: counting snakes and ladders and Wordwall-based learning. The snakes and ladders design were created in Canva, printed into banners, and played by the students after receiving the counting material. For Wordwall, we prepared practice questions according to the material, selected the features to be used, and gave the material on the day of implementation, followed by practice questions or quizzes on Wordwall. In literacy, we designed a read-aloud and charades program using puzzles. The read-aloud program aims to improve students' confidence, concentration, and reading ability. We selected grade-appropriate books and distributed them to the students, and they took turns reading with precise intonation and pronunciation. In the guessing words using riddles activity, the students read the books in small groups and then guess the words in the riddles based on the information from the reading. We start this activity by sorting the reading book, finding ten keywords, and creating a puzzle design using these words.

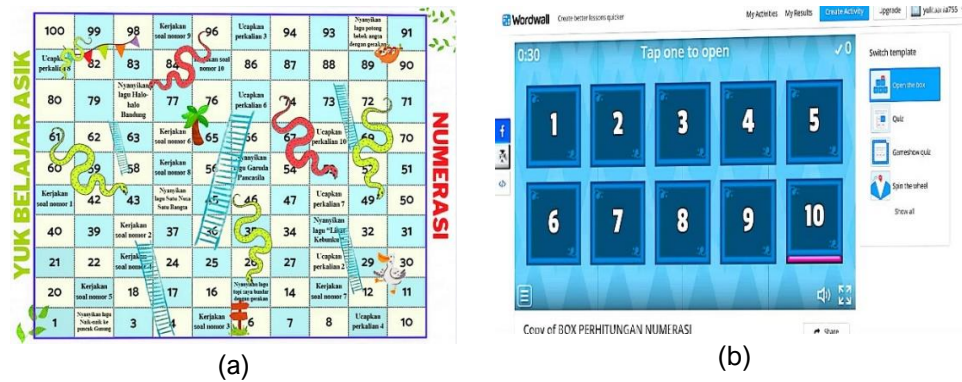


FIGURE 2. (a) Numeration Snakes and Ladders Design, (b) Wordwall design 1



FIGURE 3. (a) Wordwall Design 2, (b) Puzzle Design 1

### Implementation of Educational Games in Numeracy Literacy Learning

Based on those problematic factors, innovation in teaching methods is needed to develop 4C (Communication, Collaboration, Critical and Creative Thinking, and Problem-Solving) abilities in students in the 21st century (Sulistiyawati, Sholikhin, Afifah, & Listiawan, 2021). Mastery of technology is also essential in advancing the concept of education, including through the use of educational games that utilize technological advances. Advances in education include easy access to learning references or tutorials, the use of digital technology, and various media in the learning process (Setyo, Layn, & Trisnawati, 2022). Children who learn through digital games are usually more motivated, especially when learning alone. Developing creative and innovative learning methods is essential to make learning more effective overall (Rofiyarti & Yunita Sari, 2017; Muhson, 2010). Media plays a vital role in making learning more interesting and varied so that it looks more varied and exciting and helps knowledge transfer. Handriyantini (2009), Marc Prensky (2012), Novia Desta (2016), and Hasanah et al. (2021) state that educational games are learning media designed for educational purposes, stimulating thinking, and increasing concentration uniquely and interestingly. These games provide entertainment and support teaching and learning through fun and creative activities. They use games to stimulate thinking, improve concentration, and facilitate interactive and fun learning. The aim is to improve students' understanding and skills in various subject areas in an effective and fun way.

The government stepped in with the Kampus Belajar Mandiri (KBM) policy and the Kampus Mengajar program, where students play a role in improving the quality of learning through innovations such as educational games and helping underprivileged children in primary schools (Naitili, 2024; Lisda et al.,

2023). The team developed a Collaborative Action Plan (CAP) to improve math comprehension engagingly and effectively. The team developed two main programs in this randomized block design called Rancangan Acak Kelompok RAK: Counting Ladder Snake Game and Word Wall Learning. The Counting Snakes and Ladders is designed to teach the concept of multiplication through interactive games. Students will learn about multiplication and then participate in a game of snakes and ladders to evaluate their understanding. They will work in groups to solve math problems given on the game box. In addition, Word Wall Learning uses a digital game approach to present math materials visually and engagingly. Through Word Wall, students can better understand different types of math problems. This approach increases students' engagement in learning and helps them develop collaboration, communication, and memory skills in a mathematical context. That way, they can learn math more effectively and enjoyably.



FIGURE 4. (a) Numeracy Snakes and Ladders1, (b) Numeracy Snakes and Ladders2



FIGURE 5. (a) Wordwall-based learning 1, (b) Wordwall-Based Learning 2

Apart from the educational game program to improve numeracy skills, team also designed a program to improve student literacy, including reading and writing literacy at the Junior High School level (Di, Satap, & Maros, 2024). The programs team have prepared include Reading Aloud and Guessing Words/Guessing Pictures using Puzzles. First, the Reading Aloud Program is designed to help elementary school children improve their reading skills and reading comprehension by reading aloud in front of their friends or teachers. Children will read a variety of texts, such as short stories and poetry, with clear and expressive intonation. In addition to developing reading skills, the program also aims to increase children's confidence in public speaking, expand their vocabulary, and deepen their understanding of texts. After reading, children will answer verbal questions about the story they have read, helping them remember and understand the story better. Second, the Guess the Word/Guess the Picture Program uses Puzzles that involve word or picture puzzles to stimulate creative thinking and problem-solving. In this program, students are divided into groups, read a book, and then work together to find information on puzzle paper that is related to their reading. Those activities not only improve students' language and cognitive skills but also develop their ability to collaborate, communicate, and improve their memory while enjoying the learning process.



FIGURE 6. (a) Reading Aloud 1 (b) Reading Aloud 1

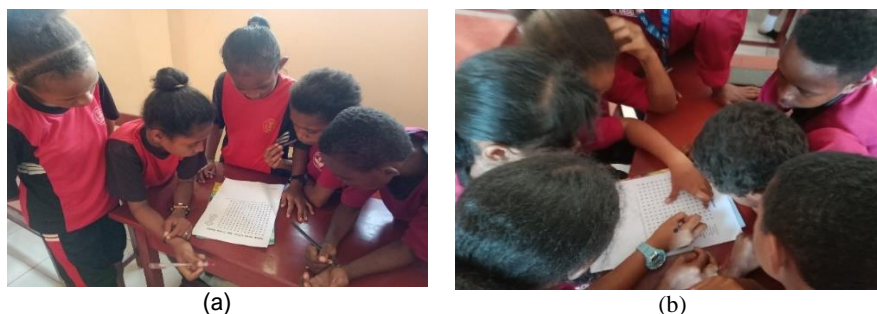


FIGURE 12. (a) Guess the word using a puzzle1 (b) Guess the word using a puzzle1

### Results of Implementing Educational Games in Numeracy Literacy Learning

The implementation of educational games such as numeracy snakes and ladders and word walls for fifth-grade of elementary school students has a significant impact on numeracy learning which can be explored in Table 1.

TABLE 1. Impact

Achievements	Literacy		Numeracy	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Increase	8	50	9	56.25
still	3	18.75	1	6.25
decrease	5	31.25	6	37.5

Based on the table above, it was found that the number of students who experienced an increase in literacy was eight students (50%), remained as many as three students (18.75%), and decreased by five students (31.25%). As for numeracy, the number of students who experienced an increase was nine students (56.25), a student (6.25%) remained, and six students (37.5%) decreased.

According to Mudrikah, et al. (2021), innovative learning should allow students to be actively involved. By counting snakes and ladders, students listen and actively participate in answering questions and completing challenges. It makes easier to understand math concepts. The word wall visualizes mathematical concepts, strengthening students' understanding through repeated exposure. In addition to increasing engagement, educational games also increase students' motivation and interest in learning. The counting ladder snake makes math fun, while the word wall provides easy access to critical information, making students more interested and motivated to learn. Students' responses to learning with educational games are very positive. They are enthusiastic, motivated, and actively participate. Students enjoy interactive learning and can absorb the material well.

Although the implementation of educational games has shown significant improvement in students' literacy skills in the fifth grade of primary school, some areas still need improvement. Some students may need more support and guidance in developing their reading fluency and comprehension skills. In addition, the "*Tebak Kata/Tebak Gambar dengan Puzzle*" program can be strengthened by adjusting the difficulty level to each student's needs so that every student feels involved and gets the maximum benefit from the activity. In addition, special attention needs to be paid to ensuring that every student can actively participate in literacy activities, including those lacking confidence or having learning difficulties. By adapting the learning approach and providing additional support to students who need it, implementing educational games can be more inclusive and effective in improving the literacy skills of all fifth-grade students. It led to a positive response from the students.

## CONCLUSION

To sum up, based on the implementation of programs such as reading load or *Membaca Nyaring*, and guessing word or *Tebak Kata/Tebak Gambar dengan Puzzle*, counting snakes and ladders, and word walls among the fifth-grade students, the students have become accustomed to and actively involved in these programs. They understand the numeracy and literacy materials through these educational games and can apply them in their daily learning. Students' responses to these activities were very positive, showing high enthusiasm, increased motivation, and confidence in problem-solving and public speaking. The program made learning more fun and exciting and helped improve student engagement and learning outcomes in numeracy literacy. It can be seen in Table 1, where it was found that the number of students who experienced an increase in literacy was eight students (50%), remained at three students (18.75%), and decreased by five students (31.25%). As for numeracy skills, the number of students who experienced an increase was nine students (56.25%), one student (6.25%) remained, and six students (37.5%) decreased. The final results showed that this educational game effectively improved some students' literacy and numeracy skills. However, some students experienced a decrease in both skills.

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