

From Challenges to Change: The Impact of Literacy and Numeracy Enhancement Programs in Rural Indonesian Schools

Ai Sifa Kaasyifa^{1*}, Ane Haerani², Helvi Oktoviani³, Neng Fufu Fauziyah², Ranti Salwa Nafilah⁴, Asep Irvan Irvani⁵

¹ Department of Communication Science, Universitas Garut, Garut, Indonesia.

² Department of Islamic Religious Education, Universitas Garut, Garut, Indonesia.

³ Department of Chemistry, Universitas Garut, Garut, Indonesia.

⁴ Department of Mathematics Education, Universitas Garut, Garut, Indonesia.

⁵ Department of Physics Education, Universitas Garut, Garut, Indonesia.

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Corresponding Author:

Author Name*: Ai Sifa Kaasyifa

Email*: kasyifahaisyifa@gmail.com

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Abstract: The Literacy and Numeracy Movement (LNM) program implemented at SMPN 8 Garut aims to enhance students' literacy and numeracy skills. This study examines the impact of the LNM program, which employs innovative approaches and technology, such as mentoring with Chromebook devices, to improve basic reading and arithmetic skills. Evaluation results indicate a significant improvement in students' literacy and numeracy abilities after participating in this program, both in basic reading and arithmetic. The program also introduces the effective use of technology in learning, which helps students access materials and complete tasks independently. The engaging, activity-based approach, including educational games, further boosts student motivation and involvement. These findings provide evidence that the LNM program can serve as an effective model for improving educational quality in areas affected by infrastructure limitations and the pandemic. The implementation of this program is expected to be adapted and expanded to other schools facing similar challenges, in order to create a more equitable education system in Indonesia.

Keywords: Kampus Mengajar Program, Literacy, LNM Program, Numeracy

Introduction

Basic education, which includes literacy and numeracy, is a crucial foundation for individual development and the quality of human resources in a nation. In Indonesia, particularly in 3T areas (Lagging, Outer, and Frontier), the challenges in achieving these basic competencies are significant. Limited infrastructure, access to technology, and the quality of teaching are major obstacles in the learning process in these regions (Abuali & Ahmed, 2025; Kundu & Bej, 2021; Okoye et al., 2023). In addition, the low motivation for learning among students and the lack of awareness regarding the importance of literacy and numeracy further exacerbate the educational situation in 3T areas (Rachmaningsih, 2024; Shoib et al., 2025).

International surveys such as PISA have shown that Indonesia has low literacy and numeracy scores compared to other countries (Esti et al., 2023; Liestari et al., 2025). This reflects the quality gap in

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education between urban and rural areas, as well as between developed and underdeveloped regions. In 3T areas, this gap is even more pronounced, with many students' literacy and numeracy levels equivalent to those of lower-grade students (Ananda et al., 2025; Rachmaningsih, 2024).

To address these challenges, the Indonesian government, through various policies and programs such as Merdeka Belajar and the School Literacy Movement (SLM), strives to improve the quality of education in 3T areas. The implementation of the Merdeka curriculum is expected to enhance students' numeracy scores, although significant disparities still exist between schools in 3T and non-3T areas (Wang et al., 2023).

The importance of literacy and numeracy as fundamental competencies that every student in 3T areas must possess is a central focus in efforts to improve the quality of education. Through well-targeted programs and collaboration between the government, communities, and educational institutions, it is hoped that the educational gap in 3T areas can be minimized, ensuring that every child in Indonesia has an equal opportunity to develop and contribute to the nation.

The COVID-19 pandemic has significantly impacted the education system in Indonesia, particularly in terms of students' literacy and numeracy skills. The closure of schools for nearly two years caused major disruptions in the learning process, with more pronounced effects in regions with limited access to technology and educational resources. Students in grades 1 to 3 across seven districts in Indonesia experienced a learning loss of up to six months in literacy and five months in numeracy within one year after the pandemic (Hazin et al., 2025; Lim et al., 2022; Spink et al., 2022). This indicates that, despite recovery efforts, students' literacy and numeracy achievements are still far below the expected standards.

The gap in access to education widened significantly during the pandemic. Students from low-income families experienced greater learning losses, with an estimated loss of up to 27.2 months in literacy and 18.1 months in numeracy compared to students from wealthier families (Boulet, 2025; Fahey IV, 2024; Marrocco, 2024). This disparity highlights that socio-economic factors play a crucial role in educational success, and the pandemic exacerbated pre-existing conditions.

To address these challenges, the Indonesian government launched various initiatives, including the "*Belajar dari Rumah*" program broadcasted through TVRI and TV Edukasi. However, the effectiveness of this program was limited by infrastructure and accessibility constraints, particularly in remote areas. For instance, in Pati Regency, Central Java, many schools lacked internet access, making online learning ineffective (Pertiwi et al., 2021).

In this context, the Literacy and Numeracy Movement (LNM) becomes crucial as an effort to recover education post-pandemic. Programs such as Kampus Mengajar can play a significant role in improving students' literacy and numeracy skills, especially in areas most affected by the pandemic. However, to achieve sustainable success, collaboration between the government, communities, and educational institutions is necessary to ensure that every student has equal access to quality education.

The Kampus Mengajar program is one of the initiatives from the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) aimed at improving the quality of education in Indonesia, particularly in 3T areas (Lagging, Outer, and Frontier). This program involves university students as teachers in partner schools to help enhance students' literacy, numeracy, and technology adaptation skills. One example of the implementation of this program can be seen in the community service activities at SMP Negeri 8 Garut, which aim to introduce and apply the Literacy and Numeracy Movement (LNM) to improve students' basic literacy and numeracy skills.

The aim of this study is to examine the results of the literacy and numeracy program within the Kampus Mengajar 4 initiative, held at SMPN 8 Garut. These results can serve as a reference for evaluating the effectiveness of the implementation of the Literacy and Numeracy Movement (LNM) in schools located in 3T areas (Lagging, Outer, and Frontier). This program aims to enhance students' basic skills in reading and arithmetic through more innovative approaches, with the support of technology and collaboration between university students, teachers, and school stakeholders.

Method

The implementation of the Kampus Mengajar 4 program at SMPN 8 Garut is focused on improving students' literacy and numeracy skills through various innovative and collaborative approaches. The program began with a clear design, where university students serve as learning companions for students, with the primary focus on the Literacy and Numeracy Movement (LNM). Each week, the university students assist the students in literacy activities, which include reading instruction, memorization, and introducing numeracy methods aimed at improving basic arithmetic skills.

The literacy program focuses on assisting students who struggle with reading by providing intensive training in basic reading instruction and the recognition of letters, words, and sentences. In numeracy, the methods applied involve fun and interactive approaches, such as educational games, to sharpen students' arithmetic skills, particularly in memorizing multiplication tables from 1 to 10, which some students find challenging. This approach aims to make learning more engaging and active for students, while also simplifying their understanding of basic mathematical concepts.

Technology plays a crucial role in the implementation of this program. University students assist the students in using the Chromebook devices provided by the school to enhance technology-based learning. With the help of this technology, students can more easily access learning materials, search for references, and complete tasks assigned by teachers, especially in Information and Communication Technology (ICT) subjects (Irvani et al., 2020; Sari et al., 2025). The university students also help students understand various applications available on the Chromebooks and ensure that these devices are used effectively to support their learning.

Evaluation and monitoring are integral parts of the implementation of this program. To assess the success of the program, diagnostic tests are conducted to measure students' literacy and numeracy abilities before and after the activities. Additionally, pre-tests and post-tests of the Minimum Competency Assessment (AKM) are also carried out to measure students' improvement in a more structured and in-depth manner. The results of this evaluation show significant progress in students participating in the LNM program, both in reading and basic arithmetic skills. This evaluation process not only serves to measure student progress but also to assess the effectiveness of the methods applied, allowing for improvements or adjustments in future implementations.

Result and Discussion

Literacy Improvement Results

The implementation of the Literacy and Numeracy Movement (LNM) at SMPN 8 Garut shows a significant improvement in students' literacy and numeracy skills. Students who previously struggled with reading and basic arithmetic began to show positive development after participating in this program intensively. This improvement aligns with research findings that indicate appropriate literacy and numeracy interventions can accelerate the recovery of students' basic skills post-pandemic (Delgado, 2023; Leahy, 2025; Mendoza, 2024).



Figure 1. Literacy and Numeracy Program Activities Using Chromebooks

The use of technology in learning, such as assisting students in using Chromebook devices, has proven effective in enhancing students' digital skills. This is also supported by research which states that the implementation of a technology-based curriculum can improve students' numeracy skills through a more adaptive and technology-driven approach (Canonizado, 2024; Nurhaswinda et al., 2025; Zhai & Wiebe, 2023).

The importance of a contextual approach in literacy learning is also emphasized in several studies, which found that instruction tailored to students' skill levels can significantly improve literacy skills in remote areas. This approach was applied in the LNM program at SMPN 8 Garut, where university students adjusted their teaching methods to match students' abilities, making the learning process more effective and enjoyable (Cameron & Rideout, 2022; Davis & Arend, 2023).

The results of the LNM program at SMPN 8 Garut show that structured interventions, the use of technology, and a contextual approach can significantly improve students' literacy and numeracy skills in 3T areas. These findings provide empirical evidence that similar programs can be implemented in other schools facing similar challenges to achieve a more equitable improvement in the quality of education across Indonesia (Kawuryan et al., 2021; Ninghardjanti et al., 2023; Widiastuti, 2025).

Numeracy Improvement

The Literacy and Numeracy Movement (LNM) program implemented at SMPN 8 Garut has also successfully improved students' numeracy skills, particularly in mastering basic mathematical concepts. One of the main focuses of the numeracy program is enhancing basic arithmetic skills, especially in memorizing multiplication tables from 1 to 10, which had previously been a challenge for some students. This program provides a systematic and enjoyable approach through various interactive learning methods.

The methods used to improve numeracy skills include diagnostic tests and intensive practice, focusing on multiplication memorization. Students are given repeated multiplication exercises in the form of games, group tasks, and periodic tests. This facilitates a deeper understanding of multiplication concepts and helps students recall multiplication results more quickly. Additionally, numeracy lessons in the classroom are complemented by the use of creative learning media, such as multiplication tables displayed in each classroom to help students memorize and remember multiplication facts more easily.

The implementation of engaging and diverse methods in numeracy learning has proven effective in enhancing student motivation. The game-based approach, which combines elements of competition and collaboration among students, not only made them more interested but also accelerated the mastery of basic mathematical concepts. Over time, test results showed that many students who initially struggled with arithmetic were now able to memorize and apply multiplication facts more effectively. This aligns with research that indicates the use of enjoyable, activity-based methods can help students develop numeracy skills effectively (Dairo et al., 2024; Rediani et al., 2024; Sanjo & Konye, 2024).

This program also integrates technology into numeracy learning, where students use Chromebook devices to practice math problems. The use of technology provides them with the opportunity to independently work on numeracy exercises, access various educational applications, and visualize mathematical concepts in a more engaging and interactive way. Thus, the LNM program at SMPN 8 Garut has not only succeeded in improving students' numeracy skills through conventional approaches but also leverages technology to offer a richer and more varied learning experience.

The results achieved in improving numeracy at SMPN 8 Garut demonstrate the positive impact of the LNM program, where students who initially struggled with arithmetic showed significant progress after undergoing structured, enjoyable learning supported by technology. This improvement in numeracy skills provides a strong foundation for students to face challenges in more advanced mathematics learning.

Positive Impact of Technology

The use of Chromebooks in the implementation of the Literacy and Numeracy Movement (LNM) program at SMPN 8 Garut has had a significant positive impact on ICT learning and helped students

complete assigned tasks. Chromebooks are used as a tool to support various learning activities, particularly in accessing lesson materials, completing assignments, and practicing digital skills that are essential for their future.

Students received direct guidance from university students on how to operate Chromebooks, including the use of productivity applications such as word processors, spreadsheets, and other internet-based learning tools. This not only enhanced students' technical skills in using digital devices but also introduced them to new, more interactive, and technology-based learning methods. The use of Chromebooks enabled students to access a wider range of learning resources, such as educational videos, interactive exercises, and educational apps that facilitate independent mastery of lesson material.

With the help of this technology, students can more easily complete tasks assigned by teachers, such as writing letters or solving math problems. Chromebooks allow them to complete assignments more efficiently, avoid writing errors, and simplify the storage and submission of tasks digitally. This is especially helpful for students who previously struggled with completing tasks manually due to limited access to writing tools and other resources. Through technology, students not only improve their literacy and numeracy skills but also enrich their digital skills, which are crucial in today's digital era.

The use of technology in learning has also had a positive impact on students' motivation. Broader access to diverse learning materials through digital platforms makes the learning process more engaging and enjoyable. This technology-supported learning method allows students to learn at their own pace, review material they have not fully understood, and explore topics in greater depth. The integration of technology in learning, such as the use of digital devices, can enhance students' numeracy and literacy skills in a more effective and enjoyable way (Anggun et al., 2025; Dorris et al., 2024; Giblin et al., 2022).

The use of Chromebooks in the implementation of the LNM program at SMPN 8 Garut has had a significant positive impact on ICT learning and enhanced students' digital skills. This program not only introduces technology as a learning aid but also prepares students to face future educational and employment challenges that are increasingly dependent on technology. With the proper integration of technology and conventional teaching methods, students can maximize their potential and achieve better learning outcomes.

Conclusion

The implementation of the Literacy and Numeracy Movement (LNM) program at SMPN 8 Garut has demonstrated substantial improvements in both literacy and numeracy skills among students. The program, which focused on providing targeted interventions in reading, writing, and basic math skills, successfully addressed the educational gaps in a rural area severely impacted by both infrastructural limitations and the ongoing effects of the COVID-19 pandemic. The use of interactive methods, such as educational games for numeracy and structured reading exercises, proved to be effective in engaging students and fostering their learning.

The findings of this study underline the importance of a well-rounded educational approach that includes not only traditional teaching methods but also the integration of technology. The use of Chromebook devices enabled students to access a variety of learning resources, providing them with more interactive and independent learning experiences. This technological aspect enhanced the students' motivation and improved their literacy and numeracy outcomes, aligning with recent research that advocates for digital tools in educational settings to support student learning and engagement.

The implications of this study are significant for other rural schools facing similar challenges. The positive impact of the LNM program at SMPN 8 Garut provides a valuable model for other schools in underserved areas. It highlights the effectiveness of combining innovative teaching strategies, technology integration, and a personalized approach to addressing the unique needs of students in these regions. By utilizing a holistic method that incorporates local context and resources, educational programs can be more impactful in enhancing foundational skills such as literacy and numeracy.

It is recommended that similar programs be scaled up in other rural and underserved areas across Indonesia. Future programs should focus on continuous training for teachers to adapt to emerging educational technologies and ensure that students continue to develop essential skills. Furthermore, it is essential to foster partnerships between local communities, educational institutions, and the government to sustain and expand such initiatives. Encouraging collaboration and feedback loops among all stakeholders will contribute to the long-term success and sustainability of educational programs, thereby improving the quality of education for all students, especially in the most disadvantaged areas.

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Conflicts of Interest

The authors declare no conflict of interest

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