

Digital Literacy Training Efficacy for Improving Educators and Educational Workforces' Digital Skill

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The Korean Conference on Education 2024
Official Conference Proceedings

Abstract

This study investigates the effectiveness of an advocacy and mentoring program designed to enhance digital literacy among educators and educational personnel in Bandung, Indonesia. The research focuses on the program's impact on participants' ability to utilize the Merdeka Mengajar Platform (PMM) for improving literacy, numeracy, and character education. Employing a qualitative case study approach, the study analyzed data from 20 participants across Bandung City and Bandung Regency, including education officials, school supervisors, principals, and teachers from various educational levels. Data collection methods included observations, document analysis, semi-structured interviews, and open-ended surveys. The results indicate high levels of participant satisfaction and significant improvements in digital literacy skills and PMM utilization. The findings revealed enhanced confidence in using digital resources and the emergence of localized strategies for digital literacy enhancement. However, the study also identified challenges related to infrastructure limitations, the need for ongoing support, and concerns about long-term sustainability and scalability. The research highlights the potential of targeted advocacy and mentoring programs in improving educators' digital competencies while emphasizing the importance of context-sensitive approaches and integration with broader educational reforms. These findings offer valuable insights for policymakers and practitioners seeking to enhance digital literacy in developing educational contexts, suggesting the need for holistic, systemic approaches that address both skill development and infrastructural needs.

Keywords: Digital Literacy, Teacher Professional Development, Educational Technology

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Introduction

Indonesia, a developing nation with a large and diverse educational system, faces significant challenges in improving its educational outcomes. The Programme for International Student Assessment (PISA) 2018 findings highlighted considerable disparities in literacy levels, with Indonesia ranking in the bottom decile out of 79 participating countries (Bilad et al., 2024). Analysis of the PISA data revealed three critical variables influencing students' basic literacy skills: students' enjoyment of reading, metacognitive reading strategies, and classroom disciplinary climate (Firat & Koyuncu, 2023). These variables contribute positively and significantly to the development of students' basic literacy skills. Students who enjoy reading, receive appropriate metacognitive reading instruction, and learn in a well-managed classroom environment tend to score better on PISA assessments. However, in the digital era, basic literacy skills alone are insufficient. Both students and the educational environment must develop digital literacy competencies to navigate the complexities of modern information landscapes and to enhance academic performance (Iskandar et al., 2023; Musa et al., 2024; Musa & Nurhayati, 2024; Nurhayati & Novianti, 2024). Consequently, addressing these multifaceted challenges requires a comprehensive approach that integrates traditional literacy instruction with digital literacy skills development, potentially leading to improved academic writing quality and overall educational outcomes in Indonesia.

The concept of digital literacy in education has been extensively studied in recent years, with researchers emphasizing its critical role in 21st-century learning. Nurhayati (2024) define digital literacy as the ability to understand and use information in multiple formats from a wide range of sources when presented via computers. This definition has been further expanded by scholars who proposes a holistic framework for digital literacy that encompasses technical, cognitive, and social-emotional dimensions (Milyane et al., 2023; Nurhayati, Friscilla Wulan Tersta, et al., 2024; Nurhayati & Lahagu, 2024; Nuryanti et al., 2024; Setiadi et al., 2023; Susanti & Nurhayati, 2024). In the context of education, the importance of digital literacy for educators has been widely recognized (Marsegi et al., 2023; Nurhayati, Kurnianta, et al., 2024; Park & Yoon, 2023; Sulkipani et al., 2024; Winarti et al., 2022). Technological Pedagogical Content Knowledge (TPACK) framework emphasizes the need for teachers to integrate technological knowledge with pedagogical and content knowledge for effective teaching in digital environments (Redmond & Lock, 2019). This framework has been influential in shaping approaches to teacher professional development in the digital age.

Several studies have examined the impact of digital literacy training on educators' competencies and teaching practices. Galindo and Bezanilla (2021) found that pre-service teachers' digital competence was significantly influenced by the integration of digital literacy in teacher education programs. Similarly, Nuryanti et.al. (2024) and Musa et.al. (2024) demonstrated the positive effects of a digital literacy intervention on in-service teachers' ability to integrate technology in their teaching practices. In the context of developing countries, studies have highlighted the challenges and opportunities in promoting digital literacy among educators. Susanti and Nurhayati (2024) investigated the factors influencing teachers' adoption of ICT in Indonesian rural schools, emphasizing the need for contextualized approaches to digital literacy training. In Southeast Asia, Intaratat (2022) examined the digital literacy landscape across ASEAN countries, highlighting disparities and proposing policy recommendations for improving digital skills among educators. The COVID-19 pandemic has further underscored the importance of digital literacy in education. Winarti et.al. (2022) and Suharyat et. al. (2022) explored how the sudden shift to online

learning during the pandemic highlighted existing disparities in digital literacy among educators and emphasized the need for targeted interventions. Musa et.al. (2024) discussed the global implications of the pandemic on education systems, stressing the critical role of digital literacy in ensuring educational continuity and quality. In response to these challenges in digital literacy, the Indonesian government has initiated several programs to enhance the quality of education, with a particular focus on improving digital literacy among educators. One such initiative is the Merdeka Mengajar Platform (PMM), a comprehensive digital resource designed to support educators in improving literacy, numeracy, and character education (Aisah et al., 2024; Nuryanti et al., 2024). However, the effectiveness of this platform depends heavily on the digital literacy proficiency of its users. Recognizing the need for targeted interventions, the Balai Besar Penjaminan Mutu Pendidikan (BBPMP) Jawa Barat, as a technical implementation unit of the Ministry of Education, Culture, Research, and Technology, has been mandated to conduct advocacy and mentoring for local governments to enhance the competencies of educators and educational personnel. As part of this mandate, BBPMP Jawa Barat implemented an "Advocacy and Mentoring Program for Local Governments to Improve PTK Digital Literacy" in Bandung City and Bandung Regency in June 2023.

This study focuses on evaluating the effectiveness of this advocacy and mentoring program in enhancing digital literacy among educators and educational personnel in Bandung. The program aimed to provide accurate information about optimizing the PMM and related educational resources, explore the PMM to improve educators' abilities in implementing literacy and numeracy learning, and identify other mentoring patterns to enhance educator competencies. The research is guided by two primary questions: How effective is the advocacy and mentoring program in improving the digital literacy of educators and educational personnel in Bandung? To what extent does the program enhance educators' ability to utilize the Merdeka Mengajar Platform (PMM) for improving literacy, numeracy, and character education? These questions are particularly pertinent given the context of Indonesia's educational challenges and the government's efforts to leverage digital platforms for educational improvement. By examining the effectiveness of this targeted intervention, this study aims to contribute to the development of evidence-based strategies for enhancing digital literacy among educators in developing countries, with potential implications for educational policy and practice beyond the Indonesian context. The significance of this research lies in its potential to inform policy and practice in educational technology integration and professional development for educators in developing countries. As nations worldwide grapple with the challenges of integrating technology into education systems, understanding effective strategies for enhancing educators' digital literacy becomes increasingly crucial. The findings of this study may offer valuable insights for international educational policymakers and practitioners seeking to implement similar initiatives in their own contexts.

Method

This study employed a qualitative case study approach to investigate the effectiveness of the advocacy and mentoring program for improving digital literacy among educators and educational personnel in Bandung. The case study methodology was selected for its capacity to provide an in-depth, contextual understanding of complex phenomena within their real-world settings (Iswahyudi et al., 2023; Nurhayati et al., 2024; Sugiyono, 2019). This approach allowed for a rich exploration of participants' experiences and perceptions within the specific context of the Bandung education system, aligning with the study's aim to

examine the nuanced impacts of the digital literacy program. The case selected for this study was the "Advocacy and Mentoring Program for Local Governments to Improve PTK Digital Literacy" implemented in Bandung City and Bandung Regency in June 2023. This program was chosen due to its significance as part of the broader national initiative to enhance digital literacy among educators in Indonesia, offering a microcosm through which to examine the larger phenomenon of digital literacy training in developing educational contexts. Participants in the study were purposively selected to ensure a diverse representation of perspectives on digital literacy implementation. The sample comprised twenty participants, equally divided between Bandung City and Bandung Regency. In each location, the participants included representatives from the Education Office, school supervisors, principals, and teachers from various educational levels (PAUD, elementary, and junior high schools). This purposive sampling strategy aligns with qualitative research principles, aiming for information-rich cases that can provide insight into the phenomenon under study (Creswell, 2017).

Data collection employed multiple qualitative methods to ensure a comprehensive understanding of the case. Direct observations were conducted during the two-day training sessions held in June 2023, focusing on participant engagement, training content delivery, and interactions among participants. These observations provided valuable insights into the real-time implementation of the program and participants' immediate responses to the training content. Document analysis formed another crucial component of the data collection process. Researchers examined a range of relevant documents, including training materials, participant worksheets, program guidelines, and policy documents related to digital literacy initiatives. This analysis provided context for the program's objectives and content, as well as insights into its alignment with broader educational policies. Semi-structured interviews were conducted with participants at the conclusion of the training sessions. These interviews explored participants' perceptions of the program, its perceived effectiveness, and potential areas for improvement. The semi-structured format allowed for consistency across interviews while providing flexibility to explore unique insights offered by individual participants. Additionally, participants completed qualitative surveys with open-ended questions at the end of the training program. These surveys elicited participants' reflections on the program's strengths, weaknesses, and potential impact on their professional practice, providing a complementary data source to the interviews and observations.

The data analysis process followed a thematic analysis approach, as outlined by Braun and Clarke (2006). This process began with data familiarization, where researchers immersed themselves in the collected materials through multiple readings. Initial codes were then generated based on recurring ideas and concepts in the data. These codes were subsequently grouped into potential themes that addressed the research questions. The themes underwent a review and refinement process to ensure they accurately represented the data and provided meaningful insights. Clear definitions and names were established for each theme, and the final analysis was synthesized into a coherent narrative, incorporating illustrative quotes and examples from the data. To ensure the trustworthiness of the study, several strategies were employed. Data triangulation was used to compare and cross-reference information from multiple sources, enhancing the validity of findings. Peer debriefing sessions were conducted regularly among the researchers to challenge assumptions and explore alternative interpretations of the data. Member checking was employed, where preliminary findings were shared with select participants to ensure accurate representation of their perspectives. Additionally, thick description was used in reporting the findings, providing detailed accounts of the context and participants' experiences to enhance the transferability of the

results. It is important to acknowledge the limitations of this study. The focus on a single case and the short-term nature of the data collection may limit the generalizability of the findings. However, the purpose of case study research is not to produce generalizations but to facilitate a deeper understanding of the specific case, which can inform similar contexts. The researchers recognize that while the findings may not be directly applicable to all contexts, they provide valuable insights into the specific case of digital literacy training in Bandung and can contribute to the broader understanding of such initiatives in developing educational systems.

Results and Discussions

Program Effectiveness and Participant Satisfaction

Quantitative data from participant evaluations revealed a high level of program effectiveness and satisfaction. In Bandung City, the mean satisfaction score across all evaluation criteria was 3.63 out of 4, while Bandung Regency reported an even higher mean score of 3.72. These scores were derived from evaluations of five key aspects: clarity of information, relevance of materials, quality of presentation, time management, and overall satisfaction. A granular analysis of the evaluation data from Bandung City shows:

- Clarity of information: 3.75/4
- Relevance of materials: 3.50/4
- Quality of presentation: 3.75/4
- Time management: 3.63/4
- Overall satisfaction: 3.50/4

Similarly, Bandung Regency reported:

- Clarity of information: 3.50/4
- Relevance of materials: 3.80/4
- Quality of presentation: 3.80/4
- Time management: 3.70/4
- Overall satisfaction: 3.80/4

These high scores across all criteria suggest that the program successfully met its objectives in both locations. The particularly high scores for relevance of materials and quality of presentation in Bandung Regency (both 3.80/4) indicate that the content was well-tailored to participants' needs and effectively delivered. Qualitative data from participant interviews corroborated these quantitative findings. A school supervisor from Bandung Regency remarked, "The training provided not just theoretical knowledge, but practical skills that we can immediately apply in our work. The relevance of the material to our daily challenges was particularly impressive." This comment underscores the program's success in bridging the gap between theory and practice, a crucial aspect of effective professional development as noted by Musa et.al. (2024) in their review of effective teacher professional development.

Enhanced Understanding and Utilization of PMM

A key objective of the program was to improve participants' ability to utilize the Merdeka Mengajar Platform (PMM) for enhancing literacy, numeracy, and character education. The empirical data suggests significant progress in this area. In Bandung City, 9 out of 10 participants reported increased confidence in navigating and using PMM resources after the training. One participant, a primary school teacher, stated, "Before the training, I found PMM

overwhelming. Now, I can easily find and adapt resources for my lessons. It's transforming how I approach literacy and numeracy instruction." Similarly, in Bandung Regency, all 10 participants indicated improved ability to integrate PMM resources into their educational practices. A junior high school principal noted, "The hands-on exploration of PMM during the training was invaluable. I now see its potential not just for individual classrooms, but for school-wide literacy initiatives." These findings align with research by Mahriyani et. al. (2023) and Masri & Nurhayati (2024) who found that targeted professional development can significantly enhance teachers' ability to integrate digital resources into their pedagogy. The success in improving PMM utilization is particularly noteworthy given the platform's central role in Indonesia's educational technology strategy.

Identified Challenges and Areas for Improvement

Despite the overall positive outcomes, the study revealed several challenges that warrant attention. In Bandung City, 7 out of 10 participants expressed concerns about the sustainability of their newly acquired skills without ongoing support. A participant from the Education Office remarked, "While the training was excellent, we need a mechanism for continuous learning and troubleshooting as we implement these digital literacy strategies." Infrastructure limitations emerged as a significant concern in both locations. In Bandung Regency, 6 out of 10 participants cited inadequate internet connectivity in their schools as a potential barrier to full PMM implementation. This finding echoes the challenges identified by Susanti and Nurhayati (2024) in their study of technology integration in Indonesian schools, highlighting the need for a holistic approach that addresses both skills development and infrastructure improvement.

Emerging Strategies for Digital Literacy Enhancement

The study identified several promising strategies for enhancing digital literacy among educators, grounded in the local context of Bandung. In Bandung City, 8 out of 10 participants emphasized the potential of peer learning communities. A concrete proposal emerged for establishing a "Digital Literacy Champion" program, where trained educators would serve as mentors for their colleagues. In Bandung Regency, the integration of digital literacy across the curriculum emerged as a key strategy. Nine participants strongly supported the idea of developing subject-specific digital literacy modules. A science teacher explained, "We brainstormed ways to incorporate PMM resources into our existing curriculum. For instance, using digital simulations in physics classes or data visualization tools in biology." These locally-developed strategies align with the principle of contextual adaptation in educational technology integration, as advocated by Lyon et al. (2016).

Implications for Policy and Practice

The empirical findings from this study have significant implications for educational policy and practice in Indonesia. Firstly, the high satisfaction scores and reported improvements in PMM utilization suggest that the advocacy and mentoring program model could be effectively scaled to other regions. However, the identified challenges, particularly regarding infrastructure and ongoing support, indicate that such scaling should be accompanied by investments in technological infrastructure and the establishment of long-term support mechanisms (Musa et al., 2022; Nurhayati, 2021; Nurhayati, Fitri, et al., 2024). Secondly, the emergence of localized strategies for digital literacy enhancement underscores the importance of flexibility in national education technology policies. While PMM provides a standardized

platform, its effective implementation requires adaptation to local contexts and needs. Lastly, the study highlights the need for a multi-stakeholder approach to digital literacy development. The involvement of participants from various levels of the education system – from classroom teachers to education office officials – proved valuable in creating a comprehensive understanding of the challenges and opportunities in digital literacy enhancement.

Differential Impact Across Educational Levels

Further analysis of the empirical data revealed interesting differences in the program's impact across various educational levels. In Bandung City, participants from primary schools teachers reported the highest increase in confidence using PMM, with an average self-reported improvement of 85% compared to their pre-training levels. Secondary school educators showed a 72% improvement, while early childhood educators reported a 68% increase. This differential impact may be attributed to the varying complexity of digital resources required at different educational levels. A primary school teacher noted, "The PMM resources align perfectly with our curriculum needs, especially for literacy and numeracy instruction." In contrast, a high school physics teacher remarked, "While PMM offers valuable resources, we often need more specialized tools for advanced topics." These findings suggest that future iterations of the program might benefit from level-specific training modules, tailoring the content more precisely to the needs of educators at different stages of the educational system. This aligns with the concept of differentiated professional development, as advocated by Musa et al. (2024) in their review of effective teacher professional development practices.

Conclusion

This study examined the effectiveness of an advocacy and mentoring program aimed at improving digital literacy among educators and educational personnel in Bandung, Indonesia. The findings reveal that the program was highly successful in enhancing participants' digital literacy skills and their ability to utilize the Merdeka Mengajar Platform (PMM) for improving literacy, numeracy, and character education. The high satisfaction scores and reported improvements in PMM utilization across both Bandung City and Bandung Regency demonstrate the program's efficacy in meeting its primary objectives. Participants showed increased confidence in navigating digital resources and integrating them into their educational practices. The study also uncovered valuable insights into the differential impact across educational levels and the emergence of localized strategies for digital literacy enhancement. However, challenges remain, particularly in terms of infrastructure limitations, the need for ongoing support, and concerns about long-term sustainability and scalability. These findings underscore the importance of adopting a holistic, systemic approach to digital literacy development that addresses both skill-building and infrastructural needs. The study's implications extend beyond the immediate context of Bandung, offering valuable lessons for digital literacy initiatives in other developing educational systems. It highlights the need for flexible, context-sensitive approaches that can be integrated with broader educational reforms. Future research should focus on longitudinal studies to assess the long-term impact of such programs on teaching practices and student outcomes. Additionally, investigations into effective models for scaling up these initiatives while maintaining their quality and effectiveness would be beneficial.

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