

Technology Education in Community Learning Centers: A Literature Review

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Abstract

This study aims to describe the role of technology in enhancing non-formal education within Community Learning Centers (CLCs) in Indonesia. This research employs a literature review method to systematically analyze relevant literature regarding the application of educational technology in CLCs. The study identifies various technological applications integrated into educational programs, such as digital skills training, administrative management, and the use of web-based applications to improve operational efficiency. The findings indicate that technology integration significantly improves the quality of education provided by CLCs, fostering greater accessibility and engagement among learners. Furthermore, this study highlights innovative teaching methods, including project-based learning and interactive media, which have proven to increase student motivation and participation. However, challenges such as inadequate infrastructure and limited technological skills among educators and learners remain barriers to the effective implementation of technology in education. This study concludes with recommendations to develop focused training programs for educators and learners to enhance digital literacy and improve the overall educational experience in CLCs. By leveraging technology, CLCs can empower communities and support lifelong learning, ultimately transforming into centers of innovation and sustainable development.

Keywords: educational technology, community learning centers, non-formal education, lifelong learning

1. Introduction

Heartbreak is an emotional condition that Technology education within Pusat Kegiatan Belajar Masyarakat (PKBM) is a critical aspect of improving the quality of non-formal education in Indonesia. Based on 2024 data from the Ministry of Early Childhood, Primary, and Secondary Education, there are 10,930 PKBMs spread across the country. These institutions function as

Community Learning Centers (CLCs), demonstrating a significant role in providing inclusive education for individuals unable to access formal schooling. CLCs serve as platforms to empower communities through inclusive and accessible education, particularly for those marginalized from the formal education system (Maghfirah, 2024). In this context, educational technology plays a crucial role in expanding the reach and effectiveness of learning

(Hidayatulloh, 2019). By leveraging technology, CLCs can offer various relevant training programs, including digital skills training, administrative management, and the use of web-based applications to improve operational efficiency (Herdiansah et al., 2021).

Digital transformation has significantly impacted various aspects of human life, including education (Achyana, 2023). Technology-based education has become an urgent necessity to face the challenges of globalization and the Fourth Industrial Revolution (Industry 4.0) (Widiyono & Millati, 2021). The application of technology in education is not limited to formal institutions such as schools and universities but also extends to the non-formal sector, such as CLCs (Sondari et al., 2018). In the context of non-formal education, technology integration holds massive potential to enhance the accessibility, effectiveness, and relevance of learning. Educational technology encompasses various forms, such as the use of digital devices, learning applications, online platforms, and social media as educational tools.

Along with the development of Information and Communication Technology (ICT), CLCs are expected to adapt and integrate technology into the learning process. This involves not only the use of hardware and software but also the implementation of innovative teaching methods, such as project-based learning and interactive media (Lutfiansyah et al., 2018). Previous studies have shown that the application of technology in education can increase student motivation and participation, as well as improve learning outcomes (Subroto et al., 2023). Furthermore, research indicates that technology use in non-formal education yields a significant positive impact on learners' outcomes. For instance, a study by Septiani (2015) found that the use of online-based learning applications in CLCs increased learners' motivation and comprehension of the material. Meanwhile, research by Painem and Soetanto (2021) revealed that educational technology integration can support the development of vocational skills among CLC participants.

However, the implementation of educational technology in CLCs also faces various challenges, including resource constraints, a lack of educator training, and the digital divide within communities (Maghfirah, 2024). Developing an effective strategy for implementing educational technology in CLCs requires a comprehensive

understanding of the existing opportunities and challenges. Therefore, it is essential to conduct an in-depth literature review regarding technology implementation in CLCs to understand these dynamics within the non-formal education context. This review focuses not only on established best practices but also identifies the constraints faced and potential solutions that can be applied.

This review will discuss various aspects related to technology education in CLCs, including implemented training strategies, the impact of technology on educational quality, and the role of CLCs in empowering communities through technology-based education. Previous research demonstrates that CLCs can be an effective alternative for improving community skills and knowledge, especially in facing the challenges of the digital era (Maryati, 2018; Sondari et al., 2018). Thus, this article aims to provide a comprehensive overview of technology education in CLCs, along with recommendations for developing more effective programs in the future.

Furthermore, this review will describe how technology can be utilized to empower marginalized community groups, such as women, individuals with disabilities, and informal workers. Thus, CLCs function not merely as places of learning but also as hubs of innovation and sustainable community development (Gunartin et al., 2018). Overall, this research will examine the literature related to technology education in CLCs by identifying key trends, research gaps, and recommendations for future implementation. Moreover, the results of this study are expected to provide a strong foundation for policymakers in formulating more effective, technology-based non-formal education strategies capable of meeting societal needs in the digital era. Using a literature-based approach, this article aims to significantly contribute to the understanding of how technology can be optimized in Indonesia's non-formal education sector. Additionally, the findings are anticipated to serve as a reference for the government in drafting policies that support the development of infrastructure and human resources in CLCs, ensuring that technology-based non-formal education programs become more equitable and sustainable across all regions of Indonesia.

2. Method

This study employs a literature review approach to examine and analyze relevant literature regarding technology education in Community Learning Centers (CLCs). This method was selected because it allows the researchers to collect, evaluate, and interpret various information sources related to the investigated topic, including scientific journals, books, research reports, and relevant articles published within a specific timeframe. The research process began with data collection from various relevant sources. A systematic search was conducted across academic databases and digital libraries to find articles discussing the application of technology in CLC education. The inclusion criteria for literature selection encompassed publications focusing on educational technology, program implementation in CLCs, and the impact of technology on learning outcomes and community empowerment. Once the data was collected, the subsequent step was content analysis. The researchers utilized qualitative analysis techniques to identify the main themes, trends, and patterns emerging from the selected literature (Liberati et al., 2009).

This process involved data coding and information categorization based on relevant categories, such as the types of technology applied, the learning methods utilized, and the outcomes achieved within the context of CLC education. Furthermore, a critical evaluation of the existing literature was conducted to assess the quality and relevance of previous studies. This included considering the methodologies used in those studies, as well as their contributions to the understanding of technology education in CLCs. In this way, this research does not merely present a summary of the existing literature but also provides deeper insights into the challenges and opportunities faced in the implementation of technology within CLCs. Finally, the results of this analysis are presented in a comprehensive narrative, encompassing recommendations for the development of technology education in CLCs, as well as implications for non-formal education policies in Indonesia. Through this approach, it is hoped that this research can significantly contribute to the development of better educational practices in the community (Snyder, 2019).

3. Result and Discussion

The results of the research on technology education in Community Learning Centers (CLCs) indicate that technology integration in

non-formal education has a significant impact on improving educational quality and empowering communities. First, educational technology serves as a vital tool in enhancing the quality of human resources in CLCs. According to Achyanadia (2016), educational technology not only facilitates the learning process but also enables more effective management and evaluation of learning resources. This aligns with the findings of Twiningsih (2022), which demonstrate that technology-based educational innovations can improve the competitiveness of educational institutions. By leveraging technology, CLCs can offer more relevant and effective programs, which in turn enhance the quality of education provided to the community.

Furthermore, the use of technology such as Augmented Reality (AR) has been proven to increase learner motivation and engagement. Khairunnisa and Aziz (2021) explain that AR can be used as an engaging learning medium, thereby creating a more interactive learning experience. This indicates that technology integration in CLC education not only increases accessibility but also enriches the learners' experience. The application of Information and Communication Technology (ICT) in education has also transformed the delivery of materials and the interaction between educators and learners. Yudhistira et al. (2021) emphasize that the use of platforms such as Zoom and Google Meet during the COVID-19 pandemic enabled more efficient distance learning. Research shows that ICT not only facilitates more flexible learning but also enhances interaction and collaboration between learners and educators, which is crucial in the context of non-formal education.

However, despite the many benefits gained from applying technology, this study also identified challenges faced by CLCs in integrating educational technology. One of the primary challenges is the lack of adequate infrastructure and technological skills among educators and learners. Hidayati (2016) notes that without strong collaboration among various educational elements, successful technology implementation is difficult to achieve. Therefore, continuous training and support are required to improve the technological skills of educators and learners. Based on the analysis, it is recommended that CLCs develop training programs focused on the use of technology in learning. These programs should include training for educators on how to utilize technology in the teaching process, as well

as digital literacy training for learners. Collaboration with formal educational institutions and non-governmental organizations is also recommended to provide the necessary resources and support.

In this study, the results and analysis obtained from the literature review on technology education in CLCs reveal several key findings, which are elaborated as follows:

3.1 The Role of Technology in Improving Educational Quality

Educational technology plays a significant role in improving the quality of human resources (HR) in CLCs. According to Sinaga and Firmansyah (2024), educational technology facilitates the learning process through the design, development, utilization, management, and evaluation of learning resources. This aligns with the findings of Twiningsih (2022), which show that designing educational innovations based on technological principles can positively impact an institution's competitiveness. By leveraging technology, CLCs can offer more relevant and effective programs, thereby improving the quality of education provided to the community.

3.2 Innovation in Learning Through Technology

The use of technology, such as Augmented Reality (AR), has been proven to increase learners' motivation. Khairunnisa and Aziz (2021) explain that AR technology can serve as an engaging learning medium, thereby increasing student involvement in the learning process. This demonstrates that integrating technology into CLC education not only improves accessibility but also enhances the quality of the learning experience for participants.

3.3 Educational Transformation Through Information and Communication Technology (ICT)

Purba and Saragih (2023) emphasize that ICT has changed how education is delivered, both in curriculum content and learning approaches. In the context of CLCs, the application of ICT enables more efficient distance learning, especially during the COVID-19 pandemic. Research results show that the use of platforms such as Zoom and Google Meet has facilitated interaction between educators and learners, ensuring that the learning process continues even under challenging conditions.

3.4 Challenges in Technology Implementation

Although there are many benefits to applying technology, this study also found several

challenges CLCs face in integrating educational technology. One primary challenge is the lack of adequate infrastructure and technological skills among educators and learners. Fahza Alfaizi et al. (2023) note that without strong collaboration among various educational stakeholders, the successful implementation of technology is difficult to achieve. Therefore, continuous training and support are required to enhance the technological skills of educators and learners.

3.5 Recommendations for the Development of Technology Education in CLCs

Based on the analysis, it is recommended that CLCs develop training programs focused on using technology in learning. These programs must include training for educators on how to utilize technology in the teaching process, as well as digital literacy training for learners. Additionally, collaboration with formal educational institutions and non-governmental organizations can help provide the necessary resources and support for developing educational technology in CLCs (Sinaga & Firmansyah, 2024).

3.6 The Broader Role of CLCs in Community Empowerment

Community Learning Centers (CLCs) play a significant role in improving access to education and community skills, particularly in the non-formal education context. CLCs function as an alternative for communities to obtain education relevant to their needs, including in the fields of technology and entrepreneurship.

First, research shows that CLCs can enhance the knowledge and skills of learners through structured training programs. For example, computer training conducted at the Bina Terampil Mandiri Kertawangi CLC proved successful in improving learners' information technology skills, which in turn helps them adapt to rapid technological advancements (Arifah et al., 2023). Furthermore, entrepreneurship programs in CLCs also show positive results in improving learners' managerial and creative abilities, as highlighted by Putri and Jamna (2018), who emphasize the importance of entrepreneurship education management.

Second, integrating technology into CLC education not only increases learning interest but also creates a more conducive learning climate. Hidayatulloh (2019) notes that applying technology in the learning process can enhance student creativity. This aligns with other findings

suggesting that the use of technology in education can expand access and improve the quality of learning in CLCs (Darmawan & Rugaiyah, 2024).

Third, CLCs also play a role in facilitating lifelong learning, which is a primary goal of non-formal education. Research by Cholidah et al. (2023) shows that a spiritual approach to mentoring in CLCs can increase learners' motivation and self-confidence, which are crucial for long-term educational success. Additionally, CLCs serve as information and resource centers for the community, aiding in overall community development (Rahman et al., 2024).

Overall, this research demonstrates that technology education in CLCs has massive potential to improve educational quality and empower communities. However, reaching this potential requires collaborative efforts and continuous support to overcome existing challenges. Thus, CLCs can function as effective centers of educational innovation in facing the challenges of the digital era.

4. Conclusion

Community Learning Centers (CLCs) play a crucial role in supporting non-formal education through skills training, technology integration, and lifelong learning. These programs have been proven to enhance learners' technological, managerial, and creative skills while simultaneously expanding access to inclusive education. By empowering individuals and communities, CLCs serve as a strategic component within the national education system, continuously adapting to the needs of society.

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