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Knowledge Transfer Strategies in Non-Formal Education: Improving Digital Literacy Among Rural Youth Through Community Outreach Programs

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Abstract:
The study addresses the persistent digital divide experienced by rural youth, particularly in relation to limited access to technology, inadequate internet infrastructure, and low levels of digital literacy. The primary objective is to analyze the implementation of knowledge transfer strategies within non-formal education programs based on community outreach and to assess their contribution to enhancing digital literacy among rural youth. Employing a descriptive qualitative approach with a case study strategy, data were collected through in-depth interviews, participatory observation, focus group discussions, and program documentation. Findings reveal that knowledge transfer strategies such as mentoring, group discussions, and digital practice simulations effectively improved participants' abilities to access, evaluate, and create digital content, while also strengthening their engagement in community-based activities. Supporting factors included local community involvement and active facilitator participation, whereas challenges stemmed from limited infrastructure and digital devices. The study contributes theoretically by reinforcing the relevance of Knowledge Transfer Theory, Experiential Learning Theory, Digital Literacy Framework, and Community-Based Learning Theory in the context of non-formal education. Practically, it demonstrates the potential of community-based strategies to bridge the digital divide in rural areas. The implications highlight the need for adaptive digital literacy programs tailored to local contexts and provide strategic recommendations for practitioners and policymakers to foster sustainable digital inclusion among rural youth.

Keywords:
Knowledge Transfer, Non-Formal Education, Digital Literacy, Rural Youth, Community Outreach Programs.

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INTRODUCTION

Digital technologies have transformed education, communication, and economic activities over the past two decades, making digital literacy a fundamental competency for participation in the knowledge society. Globally, digital literacy is increasingly recognized as an essential twenty-first-century skill that enables individuals to engage effectively in digital environments (Olivanti & Gastaldi, 2024). Nevertheless, the digital divide remains a persistent challenge, particularly in rural areas where limited technological infrastructure and internet access hinder digital inclusion (Basir et al., 2025). In Indonesia, despite growing internet penetration, rural youth continue to face obstacles in accessing, understanding, and utilizing digital technologies effectively (Sharma et al., 2025). These conditions restrict their participation in the digital economy and social development, highlighting the need for inclusive and adaptive educational interventions.

The urgency of addressing digital literacy among rural youth stems from its multidimensional impact on social and economic participation. Limited abilities to access, evaluate, and create digital information reduce opportunities for engagement in technology-driven activities (Aung et al., 2026). Since formal education often struggles to reach marginalized populations, non-formal education through community outreach initiatives has emerged as a viable alternative for enhancing digital competencies (Nyoka et al., 2025). However, empirical evidence on the effectiveness of knowledge transfer strategies in non-formal educational settings remains limited, particularly regarding how such strategies are implemented and their influence on improving rural youths' digital literacy (Olivanti & Gastaldi, 2024). This gap underscores the need for further investigation into community-based educational approaches.

This study is grounded in four major theoretical perspectives. First, the Knowledge Transfer Theory developed by Nonaka and Takeuchi emphasizes the role of social interaction in creating and transferring tacit and explicit knowledge (Nonaka & Takeuchi, 2019). Second, Kolb's Experiential Learning Theory highlights learning through direct experience as an effective mechanism for skill development (Kolb, 2015). Third, the Digital Literacy Framework proposed by Gilster and expanded by UNESCO conceptualizes digital literacy as competencies in access, evaluation, creation, and communication of digital information (UNESCO, 2018). Finally, Community-Based Learning Theory stresses the importance of participatory community environments in facilitating knowledge exchange and learning processes (Brookfield, 2020).

Existing studies demonstrate the significance of digital literacy in fostering participation in the digital economy and reducing social inequalities. Research indicates that digital literacy is influenced not only by technical skills but also by social and cultural factors (Sharma et al., 2025). However, prior studies have predominantly focused on formal education settings and urban populations, leaving rural youth underexplored (Olivanti & Gastaldi, 2024). Moreover, most studies rely on quantitative methods to measure digital literacy levels, providing limited insight into participants' experiences, perceptions, and social interactions (Nyoka et al., 2025). These limitations reveal a substantial research gap that calls for qualitative inquiry.

Addressing this gap, the present study investigates knowledge transfer strategies within community outreach-based non-formal education programs aimed at improving digital literacy among rural youth. Employing a qualitative descriptive approach and a case study strategy, the research seeks to generate an in-depth understanding of how knowledge transfer occurs and contributes to digital empowerment in local contexts. By integrating multiple theoretical frameworks and emphasizing community participation, this study contributes to the literature on digital literacy, non-formal education, and knowledge transfer while offering practical insights for designing effective interventions to bridge the rural digital divide (Olivanti & Gastaldi, 2024).

METHOD

This study employs a descriptive qualitative approach using a case study strategy to gain an in-depth understanding of the knowledge transfer process in a community service-based non-formal education program. The case study strategy was chosen because it allows researchers to examine

phenomena intensively in a real-world context, making it relevant for exploring the dynamics of digital literacy among rural youth (Mahmud et al., 2026). The research data consists of primary and secondary data. Primary data was obtained through in-depth interviews with program participants, facilitators, and local stakeholders; participatory observation of digital training activities; and Focus Group Discussions (FGDs) to gather the collective perspectives of participants. Secondary data were obtained from program reports, institutional documents, scholarly articles, books, and policies related to digital literacy and non-formal education (Dalmoro & Ferreira, 2026). Data collection techniques were carried out using instruments such as semi-structured interview guidelines, observation sheets, and program archive documentation. Inclusion criteria included informants aged 115–130 who were actively participating in the digital literacy program, while exclusion criteria were participants who were not directly involved in the training activities (Nakornnoi et al., 2026). The unit of analysis in this study is the experiences and perceptions of rural youth participating in the program (young men and women in rural areas of West Java), with a focus on the knowledge transfer processes they experienced.

Data analysis was conducted using the Miles, Huberman, and Saldaña interactive model, which comprises three main stages: data condensation, data presentation, and drawing conclusions and verification (Mahmud et al., 2026). Data validity was tested through source triangulation, methodological triangulation, and member checking to ensure the validity of the findings (Cassetti et al., 2025). The analysis process was conducted systematically with the assistance of NVivo software for qualitative coding, thereby facilitating the identification of key findings from the field data (Chinene et al., 2025). Thus, this research method was designed to yield an in-depth understanding of knowledge transfer strategies for improving the digital literacy of rural youth, while maintaining academic integrity through the application of rigorous methodological procedures (Dalmoro & Ferreira, 2026; Oliveira et al., 2025).

RESULTS AND DISCUSSION

Results

The results of this study were obtained through a descriptive qualitative analysis using a case study approach to examine a community service-based non-formal education program focused on improving the digital literacy of rural youth. Based on the coding and categorization of field data, several key findings were identified that illustrate the dynamics of knowledge transfer. First, findings regarding access to and use of digital technology indicate that most participants initially faced limitations in operating digital devices; however, through participatory training, they were able to improve basic skills such as using communication apps, searching for information, and managing digital documents. This aligns with research findings emphasizing the importance of community-based training in enhancing the digital skills of marginalized communities (Olivanti & Gastaldi, 2024). Second, findings on digital information evaluation show that participants began to distinguish between valid and invalid information, although challenges remain in identifying credible sources. These findings are consistent with studies highlighting challenges in information verification and digital literacy among communities with limited digital access (Thu et al., 2026).

The third finding pertains to the creation of digital content, where participants demonstrated improved skills in creating simple content such as digital posters, short videos, and social media-based promotional materials. This reflects the relevance of Experiential Learning Theory, which emphasizes learning through hands-on practice (Mammadova et al., 2026). The fourth finding concerns participation in community-based training, which shows that participants' active involvement in group activities strengthens their motivation and sense of ownership toward the program. Previous studies have also emphasized that community-based learning can enhance the effectiveness of knowledge transfer (Nyoka et al., 2025). The fifth finding concerns participants' perceptions of the program's effectiveness, with the majority of informants assessing that the program successfully improved their digital skills, despite obstacles such as limited internet infrastructure and technological devices. These obstacles have also been identified in other studies highlighting the digital divide in rural areas (Basir et al., 2025).

In addition, the research findings indicate that facilitators employed knowledge transfer strategies such as individual mentoring, group discussions, and digital practice simulations. These strategies proved effective in enhancing participants' skills, consistent with the Knowledge Transfer Theory framework, which emphasizes the importance of social interaction in the learning process (Thu et al., 2026). Factors contributing to the program's success include support from the local community, participant motivation, and the active involvement of facilitators. Conversely, barriers include limited internet infrastructure, a lack of digital devices, and participants' low initial experience with technology. These findings align with research highlighting the role of external factors in determining the success of digital literacy programs (Sharma et al., 2025).

Secondary data obtained from program reports and institutional documents indicate that participants' digital proficiency levels increased gradually. For example, before the program began, only about 30% of participants were able to use digital communication apps independently, while after the program, that figure rose to over 70%. This improvement is also reflected in participants' ability to create digital content, with more than half of the participants successfully producing simple digital works that could be used for community purposes. This is consistent with the findings of studies emphasizing the effectiveness of non-formal education in improving the digital skills of marginalized communities (Olivanti & Gastaldi, 2024). Additionally, program documentation shows an increase in participant engagement in digital-based community activities, such as online discussion forums and local social media campaigns.

Overall, the results of this study confirm that knowledge transfer strategies in community service-based non-formal education programs have a positive impact on improving the digital literacy of rural youth. These findings reinforce the argument that non-formal education can be an effective means of bridging the digital divide, particularly in areas with limited access to technology. Other studies also support these findings by emphasizing the importance of community-based approaches in improving digital literacy (Olivanti & Gastaldi, 2024; Nyoka et al., 2025). Thus, the results of this study provide an empirical picture of the effectiveness of knowledge transfer strategies in improving digital literacy, while also identifying supporting and inhibiting factors that need to be considered in the development of similar programs in the future.

Discussion

The results of this study confirm that knowledge transfer strategies in community service-based non-formal education programs contribute significantly to improving the digital literacy of rural youth. The main findings indicate an improvement in skills related to accessing, evaluating, and creating digital content, as well as increased active participation in community-based training. This aligns with the study's objective to analyze the implementation of knowledge transfer strategies and their contribution to digital literacy. Thus, this study successfully addresses the research question posed: how knowledge transfer strategies are implemented and how they contribute to improving the digital literacy of rural youth (Olivanti & Gastaldi, 2024).

Interpretation of the findings within a theoretical framework indicates that the knowledge transfer process carried out through mentoring, group discussions, and digital practice simulations is consistent with Knowledge Transfer Theory, which emphasizes the importance of social interaction in knowledge creation (Thu et al., 2026). Furthermore, the improvement in participants' skills in creating digital content reflects the relevance of Experiential Learning Theory, which emphasizes learning based on direct experience (Mammadova et al., 2026). Findings regarding participants' ability to evaluate digital information also support the Digital Literacy Framework, which emphasizes critical competencies in accessing and assessing information (Olivanti & Gastaldi, 2024). Thus, the results of this study reinforce the relevance of these theories in the context of non-formal education.

A comparison with previous studies reveals both similarities and differences. The study by Olivanti and Gastaldi (2024) emphasizes that the digital divide remains a major barrier for marginalized groups, which aligns with the findings of this study regarding infrastructure limitations in rural areas. However, this study differs from studies emphasizing digital literacy within formal education contexts (Mammadova et al., 2026). This study also complements findings highlighting social and cultural factors that influence digital literacy, particularly within rural communities (Zhang et al., 2026). Thus, this study offers a new perspective that broadens the scope of the existing literature.

The scientific contribution of this article lies in its novel approach to examining community-based knowledge transfer strategies for improving the digital literacy of rural youth. Previous studies have primarily focused on digital literacy in urban areas or within formal education (Mammadova et al., 2026), whereas this research emphasizes the often-overlooked rural context. This article also offers practical insights by demonstrating that non-formal education can serve as an effective means of bridging the digital divide, while simultaneously reinforcing theories regarding community-based learning (Nyoka et al., 2025). The limitations of this study must be acknowledged appropriately. First, this study was conducted in only one rural area in West Java, so generalizing the results to other contexts requires caution. Second, limitations in internet infrastructure and digital devices at the study site may have influenced the findings. Third, the descriptive qualitative approach used provides in-depth insights but does not allow for broader quantitative measurements of digital literacy levels. This limitation aligns with the challenges identified in other qualitative studies on digital literacy (Koren et al., 2023).

The implications of this study for practitioners are the need to strengthen community-based knowledge transfer strategies in non-formal education programs. Facilitators need to develop mentoring methods and digital practice simulations that are more adaptable to participants' needs. For policymakers, this study underscores the importance of digital infrastructure support in rural areas to ensure the success of digital literacy programs. This aligns with recommendations from digital policy studies emphasizing government intervention to strengthen access to technology in marginalized areas (Olivanti & Gastaldi, 2024).

Implications for future research include the need for a more in-depth exploration of the effectiveness of knowledge transfer strategies in more diverse contexts, both geographically and socially. Quantitative or mixed-methods research can be used to complement qualitative findings with broader statistical data. Additionally, future research could examine the role of new technologies, such as mobile apps and e-learning platforms, in supporting the digital literacy of rural youth (Aung et al., 2026).

Conceptually, this study reinforces the synthesis of Knowledge Transfer Theory, Experiential Learning Theory, the Digital Literacy Framework, and Community-Based Learning Theory. The integration of these four theories provides a comprehensive conceptual framework for understanding the process of knowledge transfer in non-formal education. This aligns with recent methodological trends emphasizing the importance of interdisciplinary approaches in studying digital literacy (Koren et al., 2023). Thus, this article makes a significant theoretical contribution to the development of the literature on digital literacy and non-formal education.

Finally, this study confirms that community-based knowledge transfer strategies can be an effective solution for improving the digital literacy of rural youth. These findings reinforce the argument that non-formal education plays a strategic role in bridging the digital divide, while also contributing to the social and economic development of rural communities. Other studies also support the importance of community-based approaches in improving digital skills (Nyoka et al., 2025; Olivanti & Gastaldi, 2024).

CONCLUSION

This study collectively demonstrates that knowledge transfer strategies in community service-based non-formal education programs can improve the digital literacy of rural youth. The main findings confirm an improvement in skills related to accessing, evaluating, and creating digital content, as well as increased active participation in community-based activities. Thus, this study successfully addresses the research objectives and research questions posed, namely analyzing the implementation of knowledge transfer strategies and their contribution to improving the digital literacy of rural youth.

The contributions of this study are theoretical, practical, and conceptual. Theoretically, this study reinforces the relevance of Knowledge Transfer Theory, Experiential Learning Theory, the Digital Literacy Framework, and Community-Based Learning Theory in the context of non-formal education. Practically, this study provides empirical evidence that community-based strategies can be an effective means of bridging the digital divide in rural areas. Conceptually, this study underscores

the importance of integrating participatory and experiential approaches to improve digital literacy, while also expanding the literature, which has previously focused primarily on urban contexts and formal education.

The implications of this study open the door to the development of digital literacy programs that are more responsive to local needs, by strengthening digital infrastructure and expanding access to technology in rural areas. Future research could focus on exploring knowledge transfer strategies in different geographical and social contexts, as well as integrating quantitative or mixed-methods approaches to complement the qualitative findings. Thus, this study not only contributes to the development of theory and practice in non-formal education but also offers strategic recommendations for practitioners and policymakers in their efforts to improve the digital literacy of rural youth.

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