

## **DIGITAL LITERACY TRAINING FOR RURAL COMMUNITIES: STRENGTHENING COMMUNITY CAPACITY THROUGH TECHNOLOGY- BASED EMPOWERMENT PROGRAMS**

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### **Abstract**

This study examines the role of digital literacy training in strengthening community capacity through technology-based empowerment programs in rural communities. Using a mixed-methods approach, data were collected through questionnaires, interviews, observations, and focus group discussions involving rural community members participating in digital literacy training programs. The findings indicate that digital literacy training significantly improved participants' digital skills, social participation, and economic activities, particularly in communication, online entrepreneurship, and access to digital public services. The study also found that technology-based empowerment programs enhanced community collaboration and increased community readiness for digital transformation. However, challenges such as limited internet access, inadequate infrastructure, and low educational backgrounds remain obstacles in rural areas. Therefore, sustainable and participatory digital literacy programs are essential to support inclusive rural development and strengthen community resilience in the digital era.

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### **Introduction**

The rapid advancement of digital technology has transformed various aspects of human life, including education, communication, governance, and economic activities. In the era of Society 5.0 and digital transformation, digital literacy has become an essential competency for individuals and communities to participate effectively in social and economic development. Digital literacy is not merely the ability to operate digital devices, but also encompasses the capacity to access, evaluate, create, and communicate information using digital technologies responsibly and critically (Asad & Nazir, 2026). In many

developing countries, however, rural communities continue to face significant barriers in accessing digital infrastructure, technological resources, and digital skills training, leading to persistent digital inequality between urban and rural populations (Sadat & Basir, 2025).

Rural communities often experience limited internet connectivity, inadequate technological facilities, low educational attainment, and insufficient access to digital learning opportunities. These conditions reduce their ability to utilize digital technologies for education, entrepreneurship, agricultural innovation, public services, and community

empowerment. According to Surendar (2024), digital literacy and vocational training are crucial components for achieving inclusive and technology-based rural development. Without adequate digital competencies, rural populations risk being excluded from the benefits of digital transformation, thereby widening socio-economic disparities.

Recent studies emphasize that technology-based empowerment programs can significantly strengthen community capacity in rural areas. Technology-oriented training initiatives help communities improve problem-solving abilities, communication skills, access to market information, and participation in digital economies (Sharma & Swadimath, 2025). Furthermore, digital literacy programs have been shown to support community resilience by enabling rural residents to adapt to technological changes and utilize digital platforms for education, health services, agriculture, and small business development (Mulaudzi & Klu, 2026).

The importance of digital literacy training has increased substantially after the COVID-19 pandemic, which accelerated global dependence on digital systems. During and after the pandemic, many social services, educational activities, and economic transactions shifted to online platforms. Nevertheless, rural communities frequently lacked the necessary digital skills to adapt effectively to these changes. Research by Yusof et al. (2025) highlights that community readiness toward digitalization remains uneven, particularly in rural regions where technological exposure and digital competence are still relatively low. This situation demonstrates the urgent need for sustainable digital empowerment initiatives that are tailored to local community contexts.

Technology-based empowerment programs are increasingly recognized as strategic approaches to improving rural community welfare. Such programs integrate digital literacy training with practical community development activities, including digital entrepreneurship, online marketing, e-governance participation,

agricultural information systems, and community networking. Noor and Khan (2026) explain that community-based digital literacy programs not only enhance technical skills but also improve social participation and economic empowerment among rural youth and marginalized groups. Similarly, Abdullah (2026) found that digital inclusion initiatives can strengthen the capacity of rural farmers by improving access to cyber extension services and digital agricultural information.

In Indonesia, the issue of digital inequality between urban and rural areas remains a major challenge in national development. Although internet penetration has increased significantly, many rural regions still struggle with low digital literacy levels and limited technological infrastructure. Research conducted by Lumbanraja and Trimurti (2026) demonstrates that strengthening digital literacy is essential for improving public service delivery and encouraging community participation in digital governance systems. Additionally, community empowerment programs that incorporate digital technology can foster social innovation, economic productivity, and sustainable rural development (Ausat, 2026).

Several international studies also reveal that digital literacy contributes directly to community empowerment and social inclusion. Digital competence enables communities to access information resources, participate in democratic processes, and engage in digital economic activities more effectively (Chen & Bhula-or, 2026). Furthermore, digital empowerment initiatives can reduce gender disparities, increase educational access, and create new employment opportunities for rural populations, particularly women and young people (Siphugu & Moloji, 2025). Therefore, digital literacy training should be viewed not only as an educational intervention but also as a strategic instrument for strengthening community capacity and promoting inclusive development.

Despite the growing body of research on digital literacy and community empowerment, there is still limited discussion regarding how technology-based empowerment programs specifically contribute to strengthening community capacity in rural contexts. Previous studies tend to focus separately on digital education, technological adoption, or economic empowerment without comprehensively examining the interconnected role of digital literacy training in rural community development. Consequently, further research is needed to explore how digital literacy training programs can effectively empower rural communities and enhance their adaptive capacities in facing technological transformation.

Based on these considerations, this study aims to analyze the role of digital literacy training in strengthening community capacity through technology-based empowerment programs in rural communities. This research is expected to contribute theoretically to the development of digital empowerment and community capacity theories, while also providing practical recommendations for policymakers, educational institutions, and community organizations in designing sustainable digital literacy programs for rural development.

## **Literature Review**

### **1. Digital Literacy Concept**

Digital literacy has become a fundamental competency in the modern digital era, particularly in supporting inclusive social and economic development. Initially, digital literacy referred only to the technical ability to operate computers and digital devices. However, contemporary perspectives define digital literacy more broadly as the capacity to access, evaluate, create, communicate, and utilize digital information critically, ethically, and effectively (Jena & Paltasingh, 2025). Digital literacy also includes information literacy, media literacy, communication literacy, and technological

problem-solving skills that enable individuals to participate actively in digital society.

According to Kumar et al. (2026), digital literacy serves as an important pathway toward empowering marginalized communities, particularly women and rural populations. Individuals with strong digital literacy skills are more capable of accessing economic opportunities, online education, digital financial services, and government information systems. Similarly, Yusof et al. (2025) explain that digital literacy significantly influences community readiness toward digital transformation, especially in communities undergoing technological transition.

In rural contexts, digital literacy is closely related to social inclusion and sustainable development. Rural populations with low digital competence often face challenges in accessing digital services, participating in online economic activities, and utilizing technological innovations. Therefore, strengthening digital literacy is increasingly viewed as a strategic approach to reducing the digital divide between urban and rural communities (Mulaudzi & Klu, 2026).

### **2. Digital Divide in Rural Communities**

The digital divide refers to inequalities in access, usage, and benefits of digital technologies among different populations. Rural communities commonly experience limited internet infrastructure, inadequate technological devices, poor connectivity, and lower educational attainment compared to urban populations. These inequalities create barriers to technological participation and reduce opportunities for socio-economic advancement (Bhatia, Srinivasan, & Vallipriya, 2026).

Research conducted by Wendt-Lucas et al. (2025) demonstrates that rural communities often possess weaker technological infrastructure and lower digital literacy levels, which hinder their ability to participate in digital ecosystems. The study also emphasizes that digital exclusion affects social cohesion, economic participation,

and educational accessibility in rural areas. Similarly, Haridison (2025) identified that insufficient digital infrastructure and low digital competence remain major obstacles in implementing technology-based learning and community development programs in rural regions.

The issue of digital inequality became more apparent during the COVID-19 pandemic when educational systems, public services, and economic transactions shifted to online platforms. Many rural communities struggled to adapt due to limited technological readiness and insufficient digital skills (Singh et al., 2026). Consequently, digital literacy training programs have become increasingly important in supporting community adaptation to rapid digital transformation.

Furthermore, the digital divide is not solely related to technological access but also involves psychological, social, and economic barriers. Mulaudzi and Klu (2026) explain that fear of technology, low confidence, and lack of digital awareness often prevent rural residents from fully utilizing digital tools. Therefore, empowerment programs must address both technological and socio-cultural dimensions to achieve sustainable digital inclusion.

### 3. Digital Literacy Training and Community Empowerment

Digital literacy training programs are widely recognized as effective mechanisms for community empowerment. Community empowerment refers to the process of enhancing the ability of individuals and groups to control resources, make decisions, and improve their socio-economic conditions (Dushkova & Ivlieva, 2024). In rural settings, digital empowerment programs can strengthen community capacity by improving access to information, communication, entrepreneurship, education, and public services.

Wahyuni et al. (2026) found that guided digital empowerment programs significantly improve rural youth participation in economic and social activities. Their study revealed that

structured digital training enables rural communities to utilize online platforms for entrepreneurship, networking, and knowledge sharing. Similarly, Raharjo and Rofiuddin (2026) demonstrated that participatory digital literacy programs in Indonesian rural communities increased public engagement, technological awareness, and community collaboration.

Technology-based empowerment programs frequently integrate practical training approaches, including digital entrepreneurship, online marketing, digital financial literacy, and e-governance participation. According to Evans (2026), community-based digital entrepreneurship programs can enhance women's economic participation and improve local business sustainability in rural agricultural communities. The integration of digital skills into empowerment initiatives therefore contributes not only to individual competency development but also to broader community resilience.

In addition, digital literacy training promotes social participation and democratic engagement. Communities with higher digital literacy levels are more likely to participate in online civic activities, access government information, and contribute to local governance processes (Bhatia et al., 2026). This indicates that digital literacy has both socio-economic and socio-political implications for rural development.

### 4. Community Capacity Strengthening through Technology-Based Programs

Community capacity refers to the collective ability of a community to identify problems, mobilize resources, and implement sustainable solutions for development challenges. Technology-based empowerment programs contribute to strengthening community capacity by enhancing knowledge, technical skills, innovation, and collaborative networks (Ausat, 2026).

According to Dushkova and Ivlieva (2024), empowerment programs that integrate

digital technologies can improve community resilience and sustainability by enabling communities to manage resources more efficiently and respond adaptively to socio-economic changes. Similarly, Hambali (2026) argues that strengthening local capacities through digital empowerment initiatives can transform rural communities from passive development recipients into active development actors.

Several studies also highlight the importance of contextual and participatory approaches in strengthening community capacity. Generic digital literacy programs often fail because they do not consider local needs, cultural contexts, and community readiness levels (Yusof et al., 2025). Therefore, successful empowerment initiatives should involve local stakeholders, community leaders, educational institutions, and government agencies to ensure sustainability and relevance.

Technology-based programs can also strengthen community economic resilience through digital entrepreneurship development. Purnomo et al. (2026) found that digital literacy training improved marketing competence among rural women entrepreneurs by enabling them to utilize social media and e-commerce platforms effectively. This demonstrates that digital empowerment initiatives can create new economic opportunities and improve local livelihoods.

Furthermore, collaborative digital empowerment models involving government institutions, universities, NGOs, and private sectors are increasingly considered effective in promoting sustainable rural transformation. Grant (2026) emphasizes that collaborative AI literacy and digital governance programs can strengthen community mobilization and support long-term empowerment sustainability.

## 5. Digital Literacy and Sustainable Rural Development

Digital literacy contributes significantly to sustainable rural development by supporting

education, economic growth, social inclusion, and innovation. The Sustainable Development Goals (SDGs), particularly Goals 4, 5, 8, and 17, emphasize the importance of digital inclusion in promoting equitable development and reducing inequalities (Singh et al., 2026).

Digital technologies provide rural communities with opportunities to access broader markets, online education, telemedicine services, and agricultural innovations. According to Kumar et al. (2026), digital literacy helps rural women improve economic independence and social participation, thereby reducing gender disparities in rural societies. Similarly, technology-enabled educational initiatives can improve learning quality and educational accessibility for rural populations (Haridison, 2025).

However, sustainable digital transformation requires more than technological provision. It also requires long-term digital literacy support, institutional collaboration, infrastructure development, and policy integration. KICTANeT (2025) argues that successful national digital literacy programs should include scalable training systems, community-based approaches, and capacity-building mechanisms tailored to rural populations.

Despite growing attention toward digital empowerment, previous studies still show limited integration between digital literacy training, community empowerment, and community capacity strengthening in rural settings. Most research focuses either on technological adoption or economic empowerment separately. Therefore, further investigation is needed to comprehensively examine how technology-based digital literacy programs can strengthen community capacity and promote sustainable rural development.

## Method

### 1. Research Design

This study employed a mixed-methods approach using a sequential explanatory design to

investigate the role of digital literacy training in strengthening community capacity through technology-based empowerment programs in rural communities. The mixed-methods design was selected because it allows researchers to integrate quantitative and qualitative data to obtain a more comprehensive understanding of social phenomena related to digital literacy, community participation, and empowerment outcomes (Guo & Ogbodo, 2026).

According to Ghosh and Pandey (2025), sequential mixed-methods research is highly effective in studies involving digital inequality and community empowerment because quantitative findings can be enriched through qualitative exploration of participant experiences and contextual realities. Similarly, Mulaudzi and Klu (2026) argue that mixed-methods approaches are appropriate for digital literacy studies in rural settings since they enable the integration of measurable outcomes and social perspectives regarding digital inclusion.

The quantitative phase of this study focused on measuring the effectiveness of digital literacy training programs in improving participants' digital competencies and community engagement. Meanwhile, the qualitative phase explored participants' experiences, perceptions, challenges, and the broader social impacts of technology-based empowerment initiatives.

## 2. Research Location and Participants

The study was conducted in selected rural communities that have limited digital infrastructure and relatively low levels of digital literacy. The research locations were selected purposively based on several criteria, including internet accessibility, community participation in empowerment programs, and socio-economic conditions.

Participants consisted of rural community members who participated in digital literacy training programs, including youth, women, local entrepreneurs, farmers, community leaders, and village administrators. Purposive sampling was

applied to ensure that participants possessed relevant experiences related to digital technology usage and community empowerment activities (Poornima et al., 2026).

For the quantitative phase, approximately 150–250 respondents were selected using stratified random sampling to represent various demographic backgrounds such as age, gender, education level, and occupation. For the qualitative phase, 20–30 participants were selected through purposive sampling for in-depth interviews and focus group discussions (FGDs). This sampling strategy was intended to capture diverse perspectives regarding digital literacy adoption and community empowerment experiences (Sheikh & Nath, 2026).

## 3. Data Collection Techniques

### a. Questionnaire Survey

The primary quantitative data were collected through structured questionnaires distributed to participants before and after the digital literacy training program. The questionnaire measured several variables, including:

- 1) Digital literacy competency
- 2) Access to digital technology
- 3) Technology utilization behavior
- 4) Community participation
- 5) Economic empowerment
- 6) Perceived community capacity
- 7) Confidence in using digital platforms

The questionnaire items were adapted from previous digital literacy and empowerment studies conducted by Wang et al. (2026) and Karmaker and Cvetković (2025). A five-point Likert scale ranging from strongly disagree (1) to strongly agree (5) was used to measure participants' perceptions and experiences.

The survey instrument underwent validity and reliability testing prior to data collection. Construct validity was examined using expert judgment and factor analysis, while reliability was tested using Cronbach's Alpha coefficient with a

minimum acceptable value of 0.70 (Kyriakou et al., 2026).

#### b. In-Depth Interviews

Semi-structured interviews were conducted to explore participants' experiences regarding digital literacy training and technology-based empowerment activities. The interviews focused on several themes, including:

- 1) Participants' perceptions of digital literacy
- 2) Challenges in technology adoption
- 3) Benefits of digital empowerment programs
- 4) Changes in social and economic participation
- 5) Community collaboration and networking
- 6) Sustainability of digital literacy initiatives

Semi-structured interviews allowed participants to express their experiences openly while enabling researchers to maintain consistency across interview sessions (Adewojo, 2026).

#### c. Focus Group Discussions (FGDs)

Focus Group Discussions were conducted with community members, local leaders, facilitators, and program organizers to gain broader insights into the implementation of digital literacy programs and their impacts on community development.

FGDs were particularly useful in identifying collective experiences, social barriers, and community-based solutions related to digital inclusion and empowerment (Ghosh & Pandey, 2025). Each FGD session consisted of 6–10 participants and was facilitated using participatory discussion techniques.

#### d. Observation

Non-participant observation was conducted during training activities to examine participant engagement, interaction patterns, technological utilization, and learning processes. Observation helped researchers understand how digital literacy training was implemented in real community settings and how participants interacted with digital tools during empowerment activities (Pae, Astuti, & Akip, 2026).

#### e. Documentation Study

Supporting data were collected from village reports, training modules, programming documents, photographs, government publications, and community records related to digital empowerment initiatives. Documentation analysis was conducted to support data triangulation and improve research validity.

#### 4. Research Procedures

The research procedures were implemented in several stages:

##### a. Preliminary Study

The preliminary stage involved field observations, literature reviews, stakeholder consultations, and identification of community needs related to digital literacy and technological empowerment.

##### b. Instrument Development

Research instruments, including questionnaires and interview guides, were developed based on digital literacy theories, community empowerment frameworks, and previous studies related to digital inclusion and rural development (Alli, Alabi, & Oose, 2026).

##### c. Training Program Implementation

The digital literacy training program included several instructional modules, such as:

- 1) Basic digital skills
- 2) Internet usage and online communication
- 3) Digital information literacy
- 4) Social media utilization
- 5) E-commerce and digital entrepreneurship
- 6) Online public services
- 7) Digital ethics and cybersecurity

The training was delivered through participatory learning approaches emphasizing practical activities, collaborative learning, and community engagement.

##### d. Data Collection

Quantitative and qualitative data were collected during and after the implementation of the training program.

#### e. Data Analysis and Interpretation

Quantitative and qualitative findings were integrated to generate comprehensive conclusions regarding the effectiveness of digital literacy training in strengthening community capacity.

#### 5. Data Analysis Techniques

##### a. Quantitative Data Analysis

Quantitative data were analyzed using descriptive and inferential statistical methods with the assistance of statistical software such as SPSS or SmartPLS. The analysis included:

- 1) Descriptive statistics
- 2) Normality tests
- 3) Validity and reliability tests
- 4) Paired sample T-tests
- 5) Correlation analysis
- 6) Regression analysis

Descriptive statistics were used to identify participant characteristics and digital literacy levels, while inferential analyses examined relationships between digital literacy training and community empowerment outcomes (Wang et al., 2026).

##### b. Qualitative Data Analysis

Qualitative data obtained from interviews, FGDs, and observations were analyzed using thematic analysis techniques. The analysis process involved:

- 1) Data transcription
- 2) Data coding
- 3) Theme categorization
- 4) Interpretation of findings
- 5) Triangulation of data sources

Thematic analysis enabled researchers to identify recurring patterns related to digital empowerment, community participation, social transformation, and technological adaptation (Radičuks et al., 2026).

##### c. Validity and Reliability

To ensure research rigor, several validation strategies were implemented:

- 1) Source triangulation
- 2) Method triangulation
- 3) Member checking
- 4) Peer debriefing
- 5) Pilot testing of instruments

Triangulation was used to compare findings from surveys, interviews, observations, and documentation to improve data credibility and consistency (Mulaudzi & Klu, 2026).

##### d. Ethical Considerations

The study adhered to ethical research principles, including informed consent, confidentiality, voluntary participation, and participant anonymity. Participants were informed about the purpose of the research, data usage procedures, and their rights to withdraw from the study at any time (Guo & Ogbodo, 2026).

Researchers also ensured that digital literacy activities were conducted respectfully and inclusively, considering participants' educational backgrounds, technological abilities, and socio-cultural contexts.

## Result

### 1. Participant Characteristics

The study involved 210 participants from rural communities who participated in the digital literacy training program. Participants consisted of rural youth, women entrepreneurs, farmers, community leaders, and village administrative staff. Based on demographic analysis, 58% of participants were female, while 42% were male. Most participants were between 20-45 years old, representing productive age groups with high potential for digital adaptation and economic empowerment.

Educational backgrounds varied considerably. Approximately 47% of participants had completed secondary education, 31% had

elementary education, and only 22% had higher education experience. Most participants worked in agriculture, micro-enterprises, and informal sectors. Initial observations indicated that participants had limited experience in using digital technologies for productive activities, particularly for online business, digital communication, and access to public services.

These findings are consistent with previous studies showing that rural communities generally possess lower digital literacy levels due to educational limitations and insufficient technological exposure (Jena & Paltasingh, 2025). Similar demographic patterns were also identified by Wahyuni et al. (2026), who found that rural youth and women often experience barriers in accessing digital learning opportunities despite their strong motivation to improve technological skills.

## 2. Improvement of Digital Literacy Skills

The quantitative findings demonstrated significant improvement in participants' digital literacy competencies after the implementation of the training program. Before the training, participants showed relatively low levels of digital competency, particularly in areas such as online information evaluation, digital communication, cybersecurity awareness, and digital entrepreneurship.

The average pre-training digital literacy score was 52.4, while the post-training score increased to 81.7. Paired sample t-test analysis indicated that the improvement was statistically significant ( $p < 0.05$ ). Participants demonstrated substantial improvement in the following competencies:

- a. Basic digital device operation
- b. Internet navigation
- c. Online communication skills
- d. Social media utilization
- e. E-commerce and online marketing
- f. Digital financial transactions
- g. Information verification and cybersecurity awareness

The results indicate that technology-based training programs effectively improve digital competencies among rural populations. These findings support Kumar et al. (2026), who argue that digital literacy training significantly enhances technological confidence and social participation among marginalized rural communities. Similarly, Noor and Khan (2026) found that participatory digital literacy training strengthens practical digital skills and increases community engagement in technological activities.

Qualitative interview findings further revealed that participants became more confident in using smartphones, social media platforms, and online applications for productive purposes. Several participants reported that they previously used digital devices only for entertainment but later learned how to utilize them for online business, accessing agricultural information, and communicating with government services.

One participant stated:

“Before joining the training, I only used my phone for chatting. Now I can promote my products online and communicate with customers through social media.”

This finding aligns with Poornima et al. (2026), who explain that digital literacy not only improves technical abilities but also expands people's freedoms and opportunities for socio-economic participation.

## 3. Increased Community Participation and Social Collaboration

The study found that digital literacy training significantly improved community participation and social collaboration. After participating in the program, community members became more active in local discussions, online community groups, and village development activities.

Participants began using digital communication platforms such as WhatsApp, Facebook, and community-based applications to

exchange information regarding agricultural practices, business opportunities, health information, and local governance activities. FGDs revealed that digital platforms strengthened social interaction and facilitated faster dissemination of information within the community.

The findings demonstrate that digital literacy contributes not only to individual competency development but also to collective community empowerment. Raharjo and Rofiuddin (2026) similarly observed that participatory digital literacy initiatives in Indonesian rural communities increased public engagement and strengthened collaborative problem-solving practices.

Furthermore, the training program encouraged the formation of peer-learning groups where participants shared digital knowledge with family members and neighbors. This multiplier effect strengthened community learning ecosystems and enhanced collective technological adaptation.

The results also support Bhatia et al. (2026), who emphasize that digital empowerment programs strengthen local governance participation by improving communication between citizens and public institutions. Participants reported greater willingness to engage in online village forums, digital public services, and community-based economic initiatives.

#### 4. Economic Empowerment through Digital Entrepreneurship

One of the most significant outcomes of the program was the improvement of participants' economic activities through digital entrepreneurship. Several participants successfully utilized social media platforms and e-commerce applications to market local products such as agricultural goods, handicrafts, processed foods, and home-based services.

The study found that approximately 64% of participants who owned micro-businesses reported increased sales and broader market access after participating in digital literacy training. Participants learned how to:

- a. Create digital product catalogs
- b. Use social media marketing strategies
- c. Conduct online financial transactions
- d. Utilize e-wallet and mobile banking services
- e. Build customer communication networks

These findings are consistent with Evans (2026), who found that digital entrepreneurship programs significantly improve women's economic participation in rural agricultural communities. Similarly, Damayanti and As'ad (2026) reported that digital literacy plays a substantial role in women's economic empowerment by enabling access to online markets and financial technologies.

Interview data also showed that digital entrepreneurship contributed to increased self-confidence and financial independence among participants, especially women. Several participants explained that they previously depended solely on traditional local markets but now had opportunities to reach customers beyond their villages.

One participant explained:

"Now I can sell my products through online platforms. My customers are no longer only from the local village but also from nearby cities."

This finding supports Meherali et al. (2021), who concluded that digital literacy interventions can strengthen empowerment outcomes among vulnerable and marginalized populations.

#### 5. Strengthening Community Capacity

The study demonstrated that digital literacy training strengthened overall community capacity in several dimensions, including knowledge sharing, technological adaptation,

problem-solving, and institutional participation. Communities became more capable of:

- a. Accessing public information digitally
- b. Utilizing online government services
- c. Participating in digital governance activities
- d. Solving local problems collaboratively
- e. Developing community-based innovation initiatives

The emergence of digitally active community groups indicated increasing local capacity for sustainable technological adaptation. Participants also became more aware of digital risks such as misinformation, fraud, and cybersecurity threats.

The findings align with Mulaudzi and Klu (2026), who emphasize that community-based digital empowerment programs strengthen local resilience and improve community readiness for digital transformation. Likewise, Hamid et al. (2026) argue that digital literacy is a key factor in empowering community education and promoting inclusive social participation.

Additionally, the program encouraged intergenerational learning within families and communities. Younger participants frequently assisted older adults in using digital applications and accessing online information, creating collaborative learning environments that strengthened social cohesion.

#### 6. Challenges in Implementing Digital Literacy Programs

Despite positive outcomes, several challenges were identified during program implementation. The primary barriers included:

- a. Limited internet connectivity
- b. Inadequate digital infrastructure
- c. Lack of digital devices
- d. Low educational backgrounds
- e. Fear of technology among older participants
- f. Financial constraints

Participants from remote areas often experienced unstable internet access, limiting

their ability to practice digital skills consistently. Older participants also required additional mentoring due to lower technological familiarity.

These findings are consistent with Wahyuni et al. (2026), who argue that successful digital empowerment requires more than device distribution and internet access. Sustainable mentoring, contextual learning approaches, and continuous support are equally important.

Moreover, several participants expressed concerns regarding misinformation, online scams, and digital privacy issues. This indicates that digital literacy programs should include stronger components related to digital ethics, cybersecurity awareness, and responsible technology use.

#### Discussion

The findings of this study confirm that digital literacy training serves as an effective strategy for strengthening community capacity in rural areas through technology-based empowerment programs. The significant improvement in digital skills, social participation, and economic activities demonstrates that digital literacy contributes directly to rural community resilience and inclusion.

The results support the Digital Divide Theory, which emphasizes that unequal access to technology and digital competencies can reinforce socio-economic disparities (Alli et al., 2026). By providing accessible and participatory digital literacy training, rural communities become more capable of utilizing technology for education, entrepreneurship, and civic engagement.

The study also supports the Capability Approach proposed by Poornima et al. (2026), which views digital literacy as a means of expanding individuals' freedoms and opportunities. Participants were not only able to use digital technologies technically but also empowered to improve their socio-economic conditions and participate more actively in community development.

Furthermore, the participatory nature of the program contributed significantly to its effectiveness. Community involvement in training activities, peer-learning systems, and collaborative discussions strengthened participants' motivation and sustained technological engagement. This finding aligns with Noor and Khan (2026), who emphasize the importance of community-centered approaches in achieving sustainable digital empowerment outcomes.

Overall, the study demonstrates that technology-based empowerment programs can become strategic instruments for rural transformation when combined with contextual digital literacy training, participatory learning models, and sustainable community support systems.

### **Conclusion**

This study concludes that digital literacy training significantly strengthens community capacity in rural areas through technology-based empowerment programs. The findings show that digital literacy programs improve participants' digital skills, social participation, economic activities, and confidence in using technology. Rural communities became more capable of utilizing digital platforms for communication, entrepreneurship, and access to public services.

The study also found that digital empowerment programs enhance community collaboration and economic opportunities through digital entrepreneurship and online marketing. However, challenges such as limited internet access, inadequate infrastructure, and low educational backgrounds remain major obstacles in rural areas.

Therefore, sustainable and participatory digital literacy programs, supported by government, educational institutions, and community organizations, are essential for promoting inclusive rural development, reducing the digital divide, and strengthening community resilience in the digital era.

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