

Digital Literacy in India: Challenges, Successes and Pathways for Inclusive Growth

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Abstract

Digital literacy programmes in India have emerged as crucial initiatives focused on closing the digital gap and empowering individuals, especially in rural and marginalised communities. This study investigates the effects of these programmes on job prospects, service availability, and knowledge-based empowerment enhancement. This underscores effective programmes like the Pradhan Mantri Gramin Digital Saksharta Abhiyan Yojana and the National Digital Literacy Mission, stressing the significance of governmental backing and community involvement. Nevertheless, the paper highlights significant shortcomings in current studies and initiatives, such as a narrow emphasis on at-risk groups, a lack of extensive longitudinal research, and the necessity for improved alignment with vocational training. Proposed future directions include targeted programmes for marginalised groups, the integration of digital skills with vocational training, longitudinal impact assessments, and enhanced collaboration among stakeholders. By focussing on these areas, India can improve its digital literacy initiatives to foster inclusive socio-economic growth.

Keywords: *Digital literacy, employment opportunities, marginalized populations, vocational training.*

1. Introduction

Digital literacy is a crucial competency in contemporary society, facilitating individuals' ability to traverse complex digital environments. The government's *Digital India* initiative aims to empower citizens by improving digital skills and technology access. Despite the ambitious goals of this initiative, various challenges hinder the effective implementation of digital literacy programmes, especially for marginalised populations. Accessibility issues, such as the digital divide exacerbated by socio-economic factors, insufficient infrastructure, and cultural barriers, significantly impede

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the reach and efficacy of these programmes. The implementation of digital literacy programmes in India presents challenges that disproportionately impact marginalised populations. Accessibility issues are significant barriers, primarily influenced by socio-economic factors such as poverty, low literacy rates, and insufficient infrastructure.

The digital divide continues to be a significant issue, especially in rural regions where access to reliable internet and information and communication technology (ICT) resources is limited. Research conducted by Pick, J. B., & Sarkar, A. (2015) and Nedungadi et al. (2018) highlights that these barriers present significant challenges to the objectives of the *Digital India initiative*. A comprehensive framework addressing the unique challenges of vulnerable populations is urgently required. Alongside infrastructural challenges, socio-economic factors contribute substantially to the digital divide between urban and rural populations. Numerous individuals in underserved communities lack essential resources for digital engagement, such as access to electricity and digital devices. Cultural barriers, especially those related to gender disparities, have a substantial impact on digital literacy outcomes. Studies demonstrate that conventional gender roles restrict women's access to technology and education, leading to diminished digital literacy levels in comparison to men. Research by Choudhary and Bansal (2022) identifies distinct barriers encountered by marginalised populations, such as cultural attitudes towards technology and gender biases.

Despite these challenges, India has recognized numerous digital literacy programmes as successful initiatives. Programmes such as the *Pradhan Mantri Gramin Digital Saksharta Abhiyan Yojana* and the *National Digital Literacy Mission* (NDLM) have significantly advanced the development of digital skills among the populace. The programmes illustrate the significance of governmental support and resources in promoting extensive training initiatives. Effective initiatives frequently employ flexible training models that incorporate digital literacy into educational programmes, alongside community-oriented strategies that utilise local expertise and resources. The impact of digital literacy programmes extends beyond individual skills; they significantly enhance employment opportunities, improve access to services, and empower individuals through knowledge. Programmes designed to impart digital skills can improve employability, enhance access to government services, and positively impact health outcomes, especially for marginalised groups. The interrelation of these outcomes underscores the need for continuous investment in digital literacy programmes tailored to the unique contexts of diverse communities.

Thus, despite the considerable challenges faced by digital literacy programmes in India, there is potential for success through innovative strategies and robust

governmental support. Addressing accessibility issues and cultural barriers, along with promoting inclusive frameworks, enables India to foster a digitally literate society that supports inclusive growth and empowerment for all citizens. This research paper scrutinizes the diverse obstacles faced by digital literacy initiatives in India, along with the successful programmes recognized as best practices. This study investigates the influence of digital literacy on employment opportunities, service access, and community empowerment, with the objective of identifying strategies to promote inclusive growth. It further addresses obstacles to digital engagement and analyses the challenges and successes in fostering digital literacy, thereby bridging the digital divide.

2. Review of Major Digital Literacy Programmes in India: Government Initiatives

2.1. The National Digital Literacy Mission, Pradhan Mantri Gramin Digital Saksharta Abhiyan

Government initiatives, particularly the *NDLM* and the *Pradhan Mantri Gramin Digital Saksharta Abhiyan* (*PMGDISHA*), have significantly shaped India's digital literacy landscape. These programmes constitute a component of a comprehensive strategy within the *Digital India* initiative, aimed at transforming India into a digitally empowered society and knowledge economy. The *NDLM* was initiated to guarantee digital literacy for every household, enabling efficient use of digital devices and online government services. Recent reports indicate that the initiative has effectively trained millions of individuals in fundamental digital skills, including computer operation and internet usage for tasks such as communication and information retrieval (Joseph et al., 2017; Hassan & Mirza, 2021). The programme emphasizes digital literacy as a fundamental skill required for engagement in the contemporary economy, which is increasingly reliant on technology (Khokhar, 2016; Jena, 2023).

The *PMGDISHA* seeks to enhance digital literacy for 60 million individuals in rural regions, thereby addressing the existing digital divide between urban and rural populations (Gautam et al., 2022; Kollinal et al., 2019). This initiative focusses on imparting basic digital skills while empowering rural citizens to access government services, educational resources, and economic opportunities through digital means (Nedungadi et al., 2018; Choudhuri et al., 2022). The focus on rural digital literacy is essential, as it addresses disparities in access to information and services that can improve livelihoods and enhance quality of life in these communities (Naganjani, 2023; Spires et al., 2018). Both initiatives acknowledge the complex dimensions of digital literacy, which include not only technical skills but also the capacity to critically

assess and produce digital content (Khokhar, 2016; Reedy & Goodfellow, 2014). The *NDLM* includes training designed to promote active engagement with digital content, thereby enhancing digital fluency instead of solely focussing on deficiencies (Julien et al., 2022; Maiti et al., 2019). This approach is consistent with international trends in digital literacy education, emphasising a more sophisticated comprehension of digital literacy in the 21st century (Reedy & Goodfellow, 2014; Radovanoviæ et al., 2020).

Despite these advancements, challenges persist in the implementation of digital literacy programmes in India. Infrastructural deficits, differing levels of pre-existing literacy, and socio-economic barriers persistently obstruct the effectiveness of these initiatives (Khokhar, 2016; Tomar, 2023). Moreover, continuous evaluation and adaptation of training programmes to address the evolving digital landscape is essential for maintaining the momentum of digital literacy initiatives (Patnaik, 2023). In summary, the *NDLM* and *PMGDISHA* are essential elements of India's approach to improving digital literacy, especially in rural regions. These initiatives aim to equip individuals with essential digital skills and foster an inclusive digital economy that empower all segments of society. Ongoing investment in these programmes, coupled with resolution of underlying challenges, is critical for maximizing the potential of digital literacy in India.

3. Challenges in Implementing Digital Literacy Programmes

3.1. Accessibility Issues

The implementation of digital literacy programmes in India encounters significant challenges, especially regarding accessibility issues impacting marginalised populations. The digital divide is a significant barrier, exacerbated by socio-economic factors such as poverty, low literacy rates, and insufficient infrastructure. Pick and Sarkar identify these challenges as substantial obstacles to realising the ambitious objectives of the *Digital India* initiative, which seeks to empower citizens through digital means (Pick & Sarkar, 2015). The absence of reliable internet and ICT facilities, particularly in rural regions, exacerbates the situation, as noted by Nedungadi et al., who underscore the necessity for a framework that tackles the distinct challenges encountered by vulnerable populations (Nedungadi et al., 2018). In low-resource settings, the issue of multiple literacy, including health and financial literacy, is critical. Rasekaba et al. highlight that insufficient digital and health literacy may lead to under-utilization of initiatives dependent on digital solutions, especially among older populations in rural India (Rasekaba et al., 2022).

This implies that a comprehensive understanding and interaction with digital platforms necessitates the combination of digital literacy with other forms of literacy. Intermittent electricity and low bandwidth exacerbate infrastructure challenges, hindering the effective implementation of digital literacy programmes. Khokhar examines the impact of infrastructural deficits on inclusive growth and productivity, highlighting the necessity for digital literacy initiatives to account for these contextual factors (Khokhar, 2016). Massis emphasises the importance of information literacy instruction, which is crucial for lifelong learning and success in educational and professional settings (Massis, 2011). This highlights the necessity of not only granting access to technology but also ensuring individuals have the skills to utilise it effectively. The absence of localised content and language options in digital literacy programmes presents considerable obstacles to accessibility.

Radovanoviæ et al. highlight that the lack of digital interfaces in local languages and pertinent content marginalises a significant segment of the population, especially individuals who are illiterate or semi-literate (Radovanoviæ et al., 2020). This is essential in a diverse nation such as India, where linguistic and cultural variations can greatly influence the efficacy of digital literacy programmes. To address these challenges, it is crucial to develop community-focused strategies that involve the creation of digital hubs, enabling individuals to access technology and receive training. Adeleye emphasises the importance of integrating digital literacy education into the curriculum across all educational levels to cultivate a digitally competent society (Adeleye, 2024). This method improves accessibility and enables individuals to navigate digital platforms with confidence. The implementation of digital literacy programmes in India faces various challenges, including socio-economic barriers, infrastructural limitations, and the necessity for inclusive educational frameworks. Addressing these issues necessitates a collaborative approach among policymakers, educators and community leaders to foster an environment conducive to the advancement of digital literacy, thereby enhancing the empowerment of marginalised populations.

3.2. Socio-economic Factors & Cultural and Gender Barriers

Implementing a digital literacy programme in India presents significant challenges, particularly in terms of socio-economic factors as well as cultural and gender barriers. The challenges are complex and necessitate a thorough understanding of the fundamental issues that impede effective digital literacy initiatives. Socio-economic factors significantly influence the accessibility and efficacy of digital literacy programmes. Individuals in rural and marginalised communities often lack essential resources, including reliable internet access, electricity, and digital devices, which

are critical for engaging in digital literacy training (Nedungadi et al., 2018; Khokhar, 2016). Nedungadi et al. (2018) emphasise that low internet bandwidth and insufficient ICT facilities significantly restrict low-literate learners' engagement with digital technologies.

Despite the increase in internet and mobile subscriptions, enduring obstacles such as poverty and inadequate infrastructure persistently hinder the advancement of digital literacy in India (Khokhar, 2016). The socio-economic divide results in a notable digital gap, especially between urban and rural populations, thereby intensifying existing inequalities. Cultural barriers significantly hinder the implementation of digital literacy programmes. Traditional gender roles and societal expectations often restrict women's access to technology and education, consequently impacting their levels of digital literacy (Jadallah, Y., et al., 2023; Choudhary & Bansal, 2022). Choudhary and Bansal's research highlights that marginalised populations encounter distinct barriers that impact the efficacy of digital literacy training programmes, such as cultural attitudes towards technology and gender biases (Choudhary & Bansal, 2022).

The absence of culturally relevant content and local language interfaces contributes to the alienation of specific groups, notably women and older adults, from participation in digital platforms (Radovanoviæ et al., 2020). The perception among certain individuals (especially older adults in rural areas) that digital literacy programmes are irrelevant to their daily lives reduces their motivation to engage in such initiatives. In India, gender disparities in digital literacy are notably significant, influenced by societal norms that assign distinct roles and responsibilities to men and women. Research indicates that women typically exhibit lower digital literacy levels than men, a disparity linked to cultural and educational obstacles (Jadallah, Y., et al., 2023; Choudhary & Bansal, 2022).

Findings from a systematic review demonstrate that gender differences significantly influence digital literacy outcomes, with women frequently encountering additional challenges in accessing training and resources (Choudhary & Bansal, 2022). The gender gap restricts women's involvement in the digital economy and reinforces wider societal inequalities. Addressing these challenges requires the development of inclusive digital literacy frameworks that take into account the diverse needs of different populations. These can be customized initiatives to the unique contexts of rural and marginalised communities, integrating components such as health literacy, financial literacy, and eSafety (Nedungadi et al., 2018; Khokhar, 2016). Programmes must engage with local communities to ensure content relevance and cultural appropriateness, thereby enhancing participation and engagement (Radovanoviæ et al., 2020). Addressing socio-economic and cultural barriers enhances

the effectiveness and equity of digital literacy programmes, thereby fostering a more digitally inclusive society in India.

4. Impact of Digital Literacy Programmes

Digital literacy programmes in India are essential initiatives designed to enhance employment opportunities, improve access to services, and empower individuals through knowledge acquisition. These programmes have a multifaceted impact, addressing diverse socio-economic challenges encountered by the population, especially in rural and underserved regions

The enhancement of employment opportunities via digital literacy is substantial: The Indian government has initiated programmes like the *Pradhan Mantri Gramin Digital Saksharta Abhiyan Yojana*, targeting digital literacy for 60 million rural citizens (Gautam et al., 2022). These programmes provide individuals with critical skills for operating digital devices, thus enhancing their employability in an increasingly digitised job market (Joseph et al., 2017). Studies indicate a strong correlation between digital literacy and enhanced financial literacy, which is essential for securing improved job opportunities and effectively managing personal finances (Prasad et al., 2018). This correlation highlights the necessity of combining digital literacy with vocational training to enhance employment outcomes. Digital literacy programmes enhance engagement with government services and healthcare systems, thereby improving access to these services.

Access to services: The *Digital India* initiative seeks to provide government services electronically, thereby minimising bureaucratic obstacles and improving transparency (Choudhuri et al., 2022). Digital literacy allows individuals to utilise these services more efficiently, enhancing their overall quality of life. Research indicates that digital literacy improves the use of reproductive health services among women, leading to enhanced health outcomes and lower maternal and infant mortality rates (Meherali et al., 2021). Digital methods can enhance access to health services in low and middle income countries.

Knowledge is a means towards empowerment: The significance of empowerment through knowledge in digital literacy is substantial. Digital literacy enhances individual agency, facilitating greater societal participation. Inclusive digital literacy frameworks empower marginalised populations, facilitating their engagement in economic activities and community development (Nedungadi et al., 2018). This empowerment extends beyond economic participation to include social inclusion, as individuals acquire the confidence to access information and services that were

previously inaccessible (Sharma et al., 2019). Digital literacy plays a crucial role in fostering social innovation and transformation, acting as a catalyst for wider socio-economic development (Sharma, 2023). In summary, digital literacy programmes in India significantly enhance employment opportunities, improve access to essential services, and empower individuals through knowledge acquisition. The interdependence of these outcomes emphasizes the importance of ongoing investment in digital literacy programmes, particularly in rural and underserved areas to promote inclusive growth and development.

5. Success Stories and Best Practices

Digital literacy programmes in India have become essential initiatives designed to address the digital divide, especially in rural and marginalised communities. These programmes employ diverse training models and strategies to guarantee sustainability and effectiveness. An analysis of successful digital literacy initiatives identifies several critical factors that contribute to their effectiveness. An initiative to enhance digital literacy among 60 million individuals in rural India is the *Pradhan Mantri Gramin Digital Saksharta Abhiyan Yojana*. This initiative is a component of the larger *Digital India campaign*, aimed at improving access to government services via digital platforms, thus minimising paperwork and enhancing efficiency in service delivery (Gautam et al., 2022). The *NDLM* is significant, having trained millions to utilise digital devices and engage with e-governance services (Hassan & Mirza, 2021).

Large-scale programmes highlight the significance of government support in promoting digital literacy, as they supply essential resources and infrastructure for extensive training initiatives. Effective training models exhibit adaptability and inclusivity. It is recommended to incorporate digital literacy into academic curricula across all educational levels, for ensuring that students develop essential digital skills from an early age (Susanty, 2024). Community-based approaches, implemented by local organisations and public libraries, have demonstrated effectiveness in improving digital literacy among diverse populations (Detlor & Julien, 2020). These programmes frequently utilise local knowledge and resources, enhancing their relevance and accessibility for participants. The sustainability of digital literacy programmes is a critical aspect. Effective initiatives typically integrate ongoing assessment and feedback systems, to respond to the changing requirements of learners.

The CSC e-Governance Services India Limited has implemented a comprehensive ICT literacy programme that trains individuals and evaluates the impact of this training on their proficiency in using digital tools effectively (Joseph et

al., 2017). Furthermore, the integration of digital literacy training with other educational forms, including financial and health literacy, fosters a comprehensive approach that encompasses various dimensions of empowerment (Nedungadi et al., 2018). The interconnectedness of digital skills enhances their relevance in daily life, resulting in increased participant engagement and programme sustainability. The significance of local languages and culturally relevant content is paramount. Training programmes that incorporate local languages and culturally relevant materials are more effective in engaging marginalised populations (Radovanoviæ et al., 2020). This approach fosters inclusivity and aids in establishing trust and rapport with the community, which is essential for the long-term success of digital literacy initiatives. Successful digital literacy programmes in India are characterised by robust governmental support, flexible training models, ongoing evaluation, with an emphasis on cultural relevance. The elements function synergistically to establish sustainable initiatives that empower individuals and communities, thereby contributing to a more digitally literate society.

6. Policy and Institutional Support

Enhancing government support: The effectiveness of digital literacy initiatives such as the *Pradhan Mantri Gramin Digital Saksharta Abhiyan Yojana* and the *NDLM* highlight the necessity for ongoing policy-driven backing from the Indian government. Policies must prioritise the enhancement of resources, infrastructure, and outreach in underserved regions to facilitate greater access to digital training for citizens.

Integration of digital literacy into national education policy: For sustainable impact, it is essential to incorporate digital literacy into formal education systems across all levels. The integration of digital skills into school and vocational curricula, as outlined in the National Education Policy (NEP), will facilitate the early acquisition of essential digital competencies by future generations.

Public-private partnerships: Promoting public-private partnerships is critical for securing the funding, infrastructure, and technology required for extensive digital literacy initiatives. Partnerships with technology firms, non-governmental organisations, and municipal authorities can foster innovation and enhance the implementation of digital literacy initiatives nationwide.

Continuous evaluation and monitoring mechanisms: Institutional support must encompass the creation of mechanisms for ongoing evaluation and feedback to adjust training programmes according to changing needs. This will guarantee that

digital literacy initiatives stay pertinent and adaptable to the challenges encountered by diverse communities.

7. Gaps in Existing Research and Programmes for Digital Literacy in Adult Education, India

Insufficient attention to at-risk groups: Although numerous digital literacy initiatives strive to engage a wide demographic, there is a lack of comprehensive investigation into the unique requirements and obstacles encountered by at-risk populations, including women, the elderly, and individuals with disabilities. There is a noticeable absence of customised strategies and programmes that tackle the specific obstacles faced by these populations, resulting in ongoing disparities in access to digital literacy.

Lack of longitudinal studies: There is a significant gap in research that examines the long-term effects of digital literacy programmes on employment, access to services, and overall empowerment. Many investigations concentrate on short-term results, resulting in a lack of insight into how digital literacy impacts individuals' lives in the long run and its enduring effects on socio-economic advancement.

Integration with vocational training: Existing programmes frequently fail to adequately integrate digital literacy with vocational training and skill development. Studies on effective models that integrate digital skills with practical vocational training are still scarce, which has the potential to improve employability and develop holistic educational pathways for adults.

Assessment of programme impact: Numerous current digital literacy programmes do not possess robust evaluation frameworks to thoroughly measure their effectiveness and overall impact. Standardised metrics and methodologies are essential for evaluating programme outcomes. This will enhance our understanding of effective strategies and support the replication of successful models in various contexts.

8. Future Directions for Digital Literacy in Adult Education, India

Future digital literacy initiatives should focus on creating targeted programmes that specifically cater to the needs of marginalised populations, such as women, the elderly, and individuals with disabilities. This entails the creation of inclusive training materials, the use of local languages, and the provision of essential resources to

foster equitable participation in digital literacy initiatives. The integration of digital literacy with vocational training is essential. It is imperative to create comprehensive programmes that combine these two areas effectively. Aligning digital skills with targeted occupational training can significantly improve employability, providing learners with a comprehensive skill set that addresses the needs of the changing job market. Future research efforts should prioritise conducting longitudinal studies to assess the long-term effects of digital literacy programmes on individuals and communities. This will yield important insights regarding the sustainability and effectiveness of these initiatives, guiding improved programme design and policy decisions.

Collaboration and engagement among various stakeholders, including government agencies, private sector entities, NGOs, and local communities, will be essential for the effective implementation of digital literacy initiatives. Working together can improve resource sharing, foster innovation in training techniques, and promote the creation of culturally relevant materials, all of which can lead to more effective and sustainable digital literacy programmes.

By concentrating on these pathways, India can improve its digital literacy initiatives, making them more inclusive, pertinent, and effective in fostering socio-economic advancement for all citizens.

9. Conclusion

Digital literacy programmes in India have shown considerable promise in boosting employment prospects, increasing access to vital services, and empowering individuals with knowledge, especially in rural and marginalised communities. The achievements of programmes such as the *Pradhan Mantri Gramin Digital Saksharta Abhiyan Yojana* and the *NDLM* highlight the essential influence of governmental support in delivering the required infrastructure and resources to promote extensive digital literacy.

The diverse advantages of digital literacy encompass enhanced employability, especially as individuals develop crucial skills for operating digital devices and participating in the digital economy. Furthermore, digital literacy enhances access to government and healthcare services, promoting transparency and improving overall quality of life. Knowledge empowerment allows marginalised groups to engage actively in economic and social development, thereby enhancing social inclusion. Effective digital literacy initiatives feature flexible and inclusive training frameworks,

including community-orientated strategies and the incorporation of digital competencies into educational programmes. Furthermore, ongoing assessment, cultural significance, and the incorporation of local languages strengthen the sustainability of these programmes, ensuring they cater to the diverse needs of learners.

In summary, the relationship between digital literacy and factors such as employment, access to services, and empowerment highlights its essential contribution to advancing socio-economic development. In order to ensure that these initiatives persist in promoting inclusive growth, it is crucial to maintain ongoing investment, develop innovative training models and provide culturally relevant content to sustain their impact throughout India.

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