A Systematic Literature Review for Investigating the Role of E-Learning Platforms Among Tribal Populations

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Abstract: The digital revolution in education provides new avenues for tackling educational inequalities, especially for disadvantaged groups like tribal and Indigenous peoples. This literature review discusses the role, impact, and challenges of implementing e-learning systems in tribal communities in different geographical locations. Based on the PRISMA protocol, the total number of records screened from the Scopus and Web of Science databases was 355, and 45 studies were included according to the inclusion criteria. The literature reviewed spans from 2008 to 2025 and covers studies from different continents, i.e., Asia, Africa, and Latin America. The review findings show a growing yet dispersed body of research that is mostly focused on local case studies rather than large-scale, scalable solutions. Although e-learning can contribute to increased accessibility and culturally responsive educational practices, its impact is often hindered by infrastructural weaknesses, the absence of culturally co-designed materials, and poor policy support. This review provides important lessons for policymakers, educators, and technology developers interested in creating inclusive, contextually appropriate, and sustainable e-learning solutions for tribal communities. Participatory research approaches, longitudinal research, and cross-cultural validations should be the focus of future research to improve understanding and facilitate equitable digital education.

Keywords: E-learning; Indigenous education; Tribal communities; Digital education; Mobile learning

1. Introduction

The growth of information and communication technology (ICT) has significantly influenced the global education system, enabling the achievement of new fronts in inclusive and equitable learning through e-learning platforms. E-learning, including mobile learning, massive open online courses (MOOCs), online learning management systems, and virtual classrooms, has grown quite significantly in the last decade, especially due to the COVID-19 pandemic (Dogan et al., 2025; Sohel et al., 2024). However, even with growing world-wide enthusiasm for online learning, how far these platforms cater to the interests of tribal and Indigenous communities is still under-researched.

Tribal groups, typically residing in remote and economically disadvantaged areas, face systemic barriers to quality learning. These barriers include inadequate infrastructure, a lack of trained teachers, and cultural

incompatibilities between traditional learning materials and community settings (Careaga Butter et al., 2015; Roy et al., 2023). E-learning environments hold great promise through the optimization of learning resource access across geographical distances and the delivery of culturally enriched learning experiences through adaptive digital technologies (Kim et al., 2008). If these environments are carefully designed to incorporate Indigenous voices and languages, they have the potential to build identity, resilience, and autonomy among marginalized learners (Valverde-Berrocoso et al., 2020). However, the effective application of e-learning to tribal learning is dependent on a range of variables, including internet connectivity, computer literacy, cultural context, and course design (Barikzai et al., 2024; Rohan et al., 2023). Most case studies suggest that although mobile and augmented reality technologies hold the potential to enhance interaction and skill building among tribal groups, scalability, sustainability, and support issues from institutions become significant concerns (Roy et al., 2022; R. Singh et al., 2024).

1.1. Research Gap and Research Questions

Despite greater focus on online learning, comprehensive studies continue to be vital regarding adoption and implementation of e-learning platforms by tribal groups. Determinants of adoption such as cultural assimilation, linguistic sensitization, cost-effectiveness, digital authenticity, and support from the community continue to be inadequately explored or dispersed across fragmented case studies. There continues to be a significant need for cumulative knowledge regarding determinants of adoption among tribal students, e.g., geographically localized data, mobile easiness of access to remote locations, and support from local community leaders/elders (Sathiyamoorthy et al., 2023; A. Singh et al., 2020). Similarly, the role of socio-cultural institutions, e.g., communal learning practices and intergenerational knowledge, has not been thoroughly investigated in the context of technology adoption studies of Indigenous education.

RQ1: What are the adoption factors of e-learning platforms among the tribal populations?

A number of key limitations persist in existing literature. Infrastructural issues, such as poor internet connectivity, poor power supply, and limited access to technological devices, are universally cited (Sigala, 2012; Valverde-Berrocoso et al., 2020); however, these are often addressed superficially without rigorous comparative or region-specific analyses. More fundamentally, assessments seldom integrate the cultural and linguistic disconnection between the material provided on platforms and Indigenous epistemologies. For example, while (Kulal et al., 2024) presented augmented reality tools in Indigenous vocational education, the lack of linguistic accommodation and disregard of localized storytelling traditions have been cited as primary deterrents to continued engagement. Similarly, the studies by (Patra et al., 2021; Sigala, 2012) emphasize that Indigenous knowledge structures are seldom integrated in digital content, with the result that Indigenous people experience alienation instead of empowerment. The dominance of top-down, externally driven interventions also limits the relevance and uptake of e-learning platforms in tribal contexts (Nhleko et al., 2024; Ojetunde, 2024).

RQ2: What are the challenges/barriers to e-learning platforms among the tribal populations?

Literature shows a critical shortage of impact-oriented, long-term studies. Most existing research is small-scale interventions or short-term pilot evaluations, with little evidence of long-term educational transformation or community take-up (Sathiyamoorthy et al., 2023). Moreover, there is widespread absence of policy-oriented research that offers scalable models of the uptake of e-learning in tribal education systems at regional and national scales. Few studies target emerging or future-proof technologies like generative AI, immersive virtual reality/augmented reality (VR/AR), or adaptive learning methods tailored to low-resource Indigenous settings (Sabiteka et al., 2025; Xalxo et al., 2025). Most importantly, the literature fails to support a decolonized vision for digital education—one that seeks to prioritize Indigenous worldviews and positions tribal communities as active co-creators, rather than passive consumers. Scholars like (Dadhich et al., 2021; Sigala, 2012) point to the need for digital learning platforms to genuinely reflect the lived realities, languages, and ontologies of Indigenous peoples. This shows an urgent need for future research to integrate inclusive, participatory, and culturally sustaining methodologies into the design and evaluation of e-learning platforms for tribal populations.

RQ3: What is the future agenda of e-learning platforms among the tribal populations?

This study adds a timely and useful contribution to the new literature on digital inclusion and Indigenous learning by way of a systematic review of the literature on the adoption, challenges, and future of e-learning platforms among tribal populations. Although prior work has addressed digital learning in rural or disadvantaged settings, few have incorporated empirical evidence directly on tribal or Indigenous students in diverse global settings. Adopting the PRISMA protocol and a qualitative synthesis of 45 peer-reviewed articles between 2008 and 2025, the review not only identifies major enabling and limiting factors but contributes a conceptual framework with the aim of guiding future research, policy, and practice. This study bridges gaps between educational technology, Indigenous knowledge systems, and digital equity, making thoughtful recommendations for the co-creation of culturally responsive and sustainable e-learning interventions.

2. Methodology

This systematic review of literature followed the PRISMA 2020 standards to ensure transparency, reproducibility, and methodological quality in the identification, selection, and synthesis stages of the relevant literature (Page et al., 2021). The aim was to explore the determinants of adoption, challenges faced, and future developments of e-learning platforms among tribal communities globally.

2.1. Eligibility Criteria

In order to provide room for the integration of high-quality relevant studies, definite eligibility criteria were set. The review included peer-reviewed journal articles published between 2008 and 2025, with an effort to integrate foundational and recent developments in the application of digital educational technologies among

tribal communities. Studies were integrated depending on their focus on the uptake of e-learning, mobile learning, or other education technology initiatives among tribal, Indigenous, or marginalized communities. To ensure that the articles were aligned with the goals of the review, only those that clearly addressed factors influencing the uptake of e-learning platforms, issues encountered, or proposed future research directions were included. In order to ensure homogeneity in analysis and interpretation, only published studies in the English language were included. Qualitative and quantitative research designs, including empirical studies, case studies, as well as systematic or narrative reviews, were suitable for incorporation.

Alternatively, conference proceedings, editorials, opinion articles, and dissertations were omitted from this review because of the common lack of peer review and stringent methodological critique. Additionally, studies that were done on non-Indigenous or urban communities only were omitted for the purpose of preserving the specificity of the tribal context. Lastly, articles that did not have sufficient methodological description or did not have thematic emphasis on digital education were omitted from the final dataset. These exclusion procedures allowed the inclusion of quality research in the right context and consequently allowed for meaningful insights into the contribution of e-learning platforms among tribal communities.

2.2. Information Sources and Search Strategy

To allow for a systematic and holistic retrieval of relevant literature, the review utilized a robust search strategy through the utilization of two of the most esteemed scholarly databases—Scopus and Web of Science—both well known to have extensive coverage of high-quality, peer-reviewed research articles across a wide range of subjects. Literature search was carried out between March and May 2025 with a concentration on the retrieval of articles that have been published between the years 2008 and 2025 in order to shed light on trends and advancements in digital schooling among tribal and Indigenous populations. A robust search string was utilized to determine relevant articles. Search terms were combinations of ("e-learning" OR "digital learning" OR "online education" OR "mobile learning" OR "MOOCs" OR "ICT in education") AND ("tribal" OR "Indigenous" OR "First Nations" OR "Aboriginal" OR "Adivasi" OR "ethnic minority") AND ("adoption" OR "barriers" OR "challenges" OR "impact" OR "access" OR "digital inclusion"). Boolean operators like AND and OR were utilized in order to narrow the findings, and truncation strategies were adapted to suit the syntax requirements of each database, thus improving the sensitivity and scope of the search. This systematic process enabled the retrieval of a concentrated yet comprehensive corpus of literature on the adoption, challenges, and future directions of e-learning platforms among tribal populations.

2.3. Study Selection Process

The process of study selection followed the systematic steps outlined under the PRISMA 2020 guidelines, i.e., identification, screening, eligibility, and inclusion. In the identification process, an initial list of studies was generated through extensive Scopus and Web of Science searches. After excluding duplicates, 355 articles remained for assessment. In the screening process, the titles and abstracts of the articles were screened for

relevance against the inclusion criteria drawn up. Thereafter, 205 articles were excluded because they were either not relevant to tribal populations or did not cover topics on digital education or e-learning. After the screening process, the eligibility phase consisted of a careful reading of the complete texts of the shortlisted 80 articles. These studies were carefully examined to assess the methodological quality, contextual appropriateness, and alignment with the review objectives. Consequently, 35 articles were removed due to poor methodological clarity or failure to concentrate on adoption factors, barriers, or possible directions towards e-learning among tribal populations. Lastly, 45 thematic-relevance, high-quality articles were included in the final synthesis of this systematic review. The entire selection process is shown in the PRISMA flow diagram (Figure 1) to promote transparency and replicability.

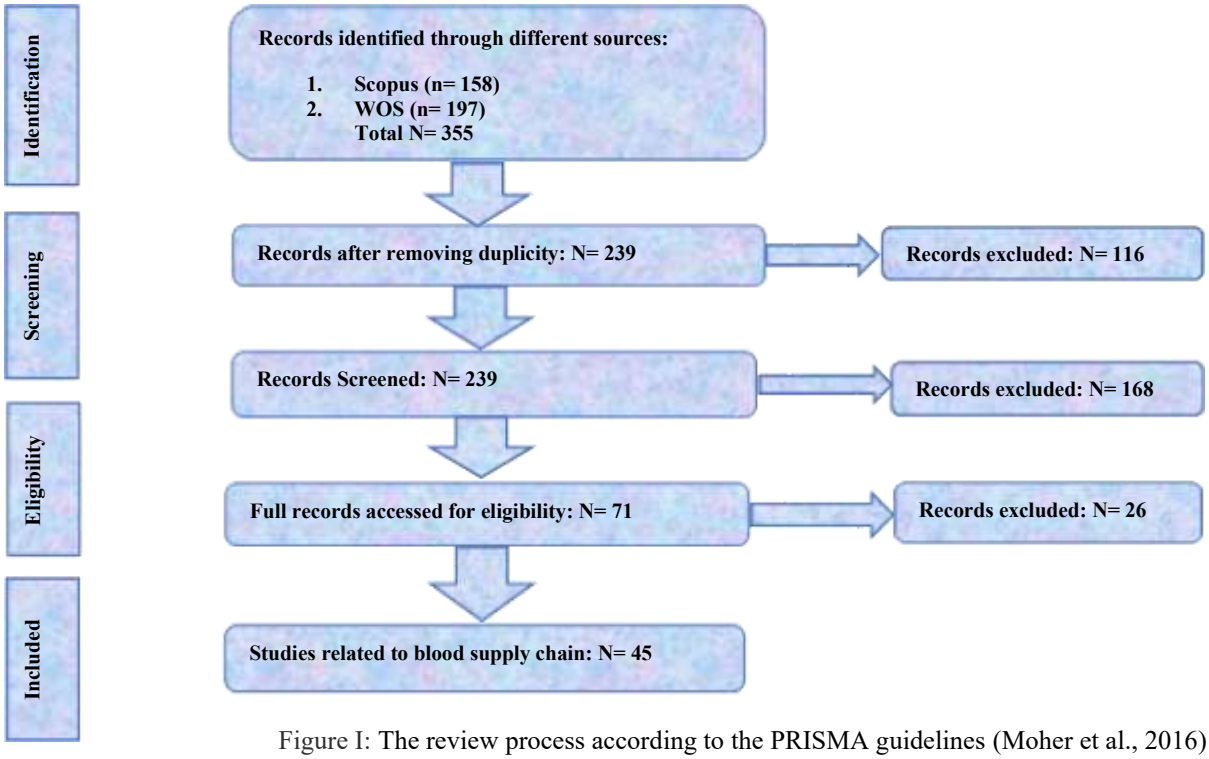

Figure I: The review process according to the PRISMA guidelines (Moher et al., 2016)

3. Findings

3.1. Publication Year Trends

The review represented a major surge in academic interest in the adoption of e-learning by tribal and Indigenous communities in the last 15 years. Early reports, such as (Borazon et al., 2024; Xalxo et al., 2025), laid the groundwork necessary for mobile learning in marginalised communities. A substantial boost in publications, however, followed after 2020, likely fueled by the global transition to digital precipitated by the COVID-19 pandemic (Ojetunde, 2024; Yalamu et al., 2025). Of particular interest, the timeframe 2023-2025 accounted for over 40% of all studies examined, reflecting an increasing concern for bridging the digital divide to Indigenous learners in the post-pandemic years.

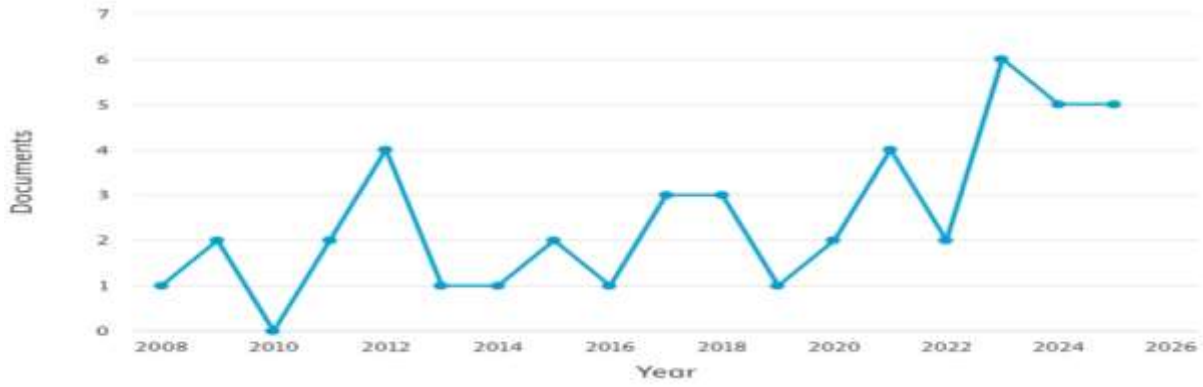

Figure II: Publications year trends

3.2. Geographic coverage of the publications

The country distribution of studies, as seen in the provided figure, reflects a clear geographical disparity in the research focus towards the adoption of e-learning among Indigenous and tribal populations. Australia leads with the maximum number of publications (13 documents), reflecting the nation's long-standing interest in Indigenous education, particularly among Aboriginal and Torres Strait Islander groups. Australia is trailed by the United States, with 8 studies, reflecting growing interest in Native American education and the digital equity challenges. Other nations with significant representation are Canada, India, New Zealand, Colombia, and Peru, all of which have added 3 to 4 studies each. These nations have significant tribal or Indigenous populations and have had government or academic efforts for digital inclusion. The United Kingdom, Chile, and Malaysia have lower frequencies (2 documents or fewer), reflecting some activity but low concentration. The trend reflects focus on research in Anglophone nations and Latin America but reflects an absence of consideration of studies in Africa, the Middle East, and Central Asia, where Indigenous communities also experience pervasive learning issues. The evidence points toward increased global representation and site-specific studies to reveal context-specific constraints and trends in digital learning for marginalised communities.

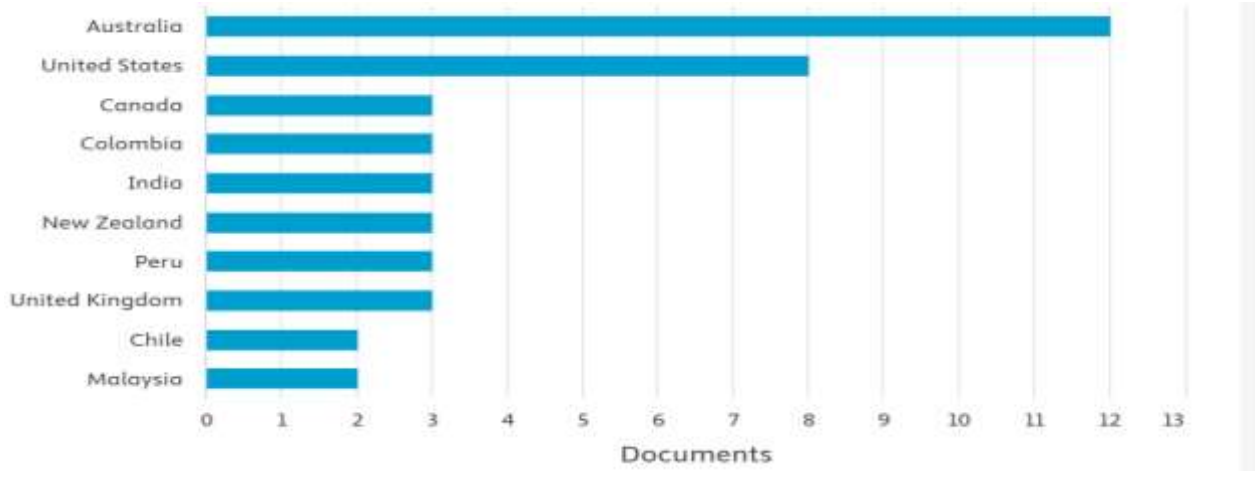

Figure III: Geographic Coverage of the Publications

3.3. Theories used in the research domain

The theoretical implications of this systematic review highlight the intricate and multidisciplinary nature of e-learning adoption in tribal communities. The majority of studies borrow from the Unified Theory of Acceptance and Use of Technology (UTAUT), which explains the decision-making process individuals go through in adopting digital technologies for learning. Social influence, facilitating conditions, effort expectancy, and performance expectancy are all significant predictors of the adoption of e-learning by tribal communities. For instance, studies conducted by (Nhleko et al., 2024; Rao, 2011) concluded that once tribal learners perceive the potential of digital technologies to improve their literacy, employability, or social mobility, they are likely to use these technologies. However, effort expectancy is most frequently hindered by complex interfaces, digital illiteracy, and contents not optimized to accommodate Indigenous needs, thus capping extended use. In general, the literature is that effective e-learning interventions should be grounded in hybrid theoretical frameworks that take into account the technological, cultural, social, and political context of Indigenous learners.

4. Discussion

The systematic review suggests that the uptake of e-learning by Indigenous and tribal populations is influenced by the intricate interplay of infrastructural, socio-cultural, pedagogical, and policy-related factors. The evidence suggests that even if digital education holds a gigantic potential to reduce education inequalities, its success depends to a large extent on the contextual adaptation and participatory design approaches. First and foremost, the review suggests a geographical and thematic gap in the literature. Most of the research is conducted on countries like Australia, the United States, Canada, and India, while tribal populations from countries in Africa, Central Asia, and Southeast Asia are significantly underrepresented. There are also few longitudinal studies evaluating the long-term impacts of e-learning on academic achievement, employability, or cultural revitalization. There are also very few studies that employ Indigenous theoretical perspectives, such as decolonial theory or Indigenous standpoint epistemologies, which calls for more grounded and participatory research in the future. Overall, even if e-learning platforms hold a gigantic potential to reach hard-to-reach groups, their success hinges on culturally sensitive design, localized infrastructure, multilingual access, and policy alignment. Closing the digital divide is not merely a question of availability of technology but also an inclusive framework that honours tribal histories, values, and educational aspirations.

4.1. RQ1: What are the adoption factors of e-learning platforms among the tribal populations?

The adoption of e-learning platforms by tribal communities is influenced by a wide range of factors, such as technological preparedness, perceived usefulness, accessibility, and cultural sensitivity. Various studies (Barikzai et al., 2024; A. Singh et al., 2020) suggest that tribal learners are more likely to adopt electronic learning when electronic platforms are available through mobile phones, which are becoming increasingly accessible even in remote communities. Whether students perceive that electronic tools will improve their

skills, job prospects, or literacy level also has a significant influence on the adoption rate (Kulal et al., 2024; Sathiyamoorthy et al., 2023). Additionally, facilitation and support at the community level are powerful drivers. Where local teachers, tribal leaders, or family members embrace digital learning, uptake is increased (Rao, 2011). Accessibility of culturally responsive materials, such as language-based apps (Yalamu et al., 2025), and community-based learning methods also enhances uptake. Some platforms developed with Indigenous pedagogies and imagery perform better than off-the-shelf products, according to research by (Sabiteka et al., 2025). These findings harmonise with the UTAUT model, where effort expectancy and performance, and facilitating conditions, directly impact the acceptance of users.

4.2. RQ2: What are the challenges/barriers to e-learning platforms among the tribal populations?

Despite growing interest and possibility, tribal societies face a complex set of linked obstacles in embracing e-learning. The largest obstacle is from infrastructural limitations—namely, poor internet connectivity, unstable power supply, and lack of digital hardware exclude many tribal learners from accessing e-learning platforms (Yalamu et al., 2025). Furthermore, even when devices exist, digital divides restrict effective use, especially among older cohorts or periphery sub-groups within tribal societies (Sabiteka et al., 2025). There are also cultural and language differences. The majority of platforms do not support local languages, cultural stories, or Indigenous worldview as well, leading to lower relevance and credibility (Borazon et al., 2024). Such a feeling of foreignness discourages motivation and participation. Gender inequality and socioeconomic marginalization further intensify the issues around access to digital technology, which disproportionately affect women and economically marginalized tribal families (Ojetunde, 2024). Another problem of great importance is the prevalence of the top-down approach in the majority of digital education efforts. The majority of efforts are designed with inadequate community participation or common input, meaning that the resulting solutions lack high fidelity to local pedagogy or social structure (Nhleko et al., 2024). This aligns with the concept of the digital divide, which highlights that differences in access, capacity, and use are shaped by underlying social inequalities.

4.3. RQ3: What is the future agenda of e-learning platforms among the tribal populations?

The future of e-learning among tribal communities requires a transition from access to inclusion, empowerment, and sustainability. Future research and practice need to concentrate on community-led content development where the tribe members are involved in the development of curricula, tools, and platforms that align with their learning aspirations and cultural values (Sigala, 2012). This aligns with the capability approach, which encourages the establishment of real freedoms and opportunities among the marginalised learners. The localisation and language integration are also vital. Studies by (A. Singh et al., 2020) show that materials that reinforce learning in one's language or that include indigenous knowledge add more effectiveness. Additionally, there is growing demand for the development of hybrid models of instruction that combine traditional oral knowledge with technology modalities (Kulal et al., 2024; Sathiyamoorthy et al., 2023). In addition, policy endorsement, digital infrastructure investment, and professional development of

teachers in culturally responsive teaching will be imperative to the growth and sustainability of e-learning initiatives (Barikzai et al., 2024; R. Singh et al., 2024). With innovations in e-learning such as augmented reality, mobile learning, and community-based uses, future programs need to shift towards inclusivity and contextualization. The research agenda will have to investigate longitudinal impact, gendered learning, and intergenerational learning in tribal education settings.

5. Conclusion

This systematic review contrasted the application, challenges, and future of e-learning platforms among tribal communities by examining 45 peer-reviewed articles released between 2008 and 2025. Findings suggest that while e-learning has profound potential in addressing gaps in education among marginalised communities, its adoption is highly influenced by contextual factors such as the availability of infrastructure, culture-friendliness, community engagement, and levels of digital literacy. Research has shown that digital platforms that are localised, community-focused, and attuned to Indigenous values and practices are more likely to be successful in engaging tribal learners. Yet, despite all these issues—lack of proper internet connectivity, limited device access, language barriers, and exclusion of communities from the decision-making process—still impede the accessibility and efficacy of digital education to such people. The assessment also points out that most existing initiatives employ hierarchical approaches, which are not culturally sensitive and do not promise long-term sustainability, and therefore are not actually empowering the very individuals they seek to benefit. In planning for future development, this research emphasizes the need for e-learning programs to incorporate hybrid theoretical models that integrate technological, sociocultural, and empowerment orientations. Cooperative collaboration with tribal populations, culturally sensitive digital resources, policy measures towards infrastructure and training upgrades, and gender- and socio-economic-sensitive strategies must become the focus of future practice and research. Only by such a comprehensive approach can e-learning platforms make a real contribution to Indigenous development and educational justice.

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