

Harnessing Digital Technology for Contextual Learning of Local Social Issues: A Systematic Literature Review

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Abstract: Harnessing Digital Technology for Contextual Learning of Local Social Issues: A Systematic Literature Review. Objectives: This study explores the use of digital technologies in enhancing contextual learning, focusing on their role in addressing local social issues. The research aims to synthesize current literature to identify trends, technological tools, pedagogical frameworks, challenges, and provide recommendations for optimizing the integration of educational technologies in locally relevant learning environments. **Methods:** Firstly, to use a systematic literature review (SLR) of 27 peer-reviewed studies from the Scopus database, published between 2016 and 2025. Secondly, by following PRISMA 2020 guidelines, the evaluation identifies trends in digital technologies, such as Virtual Reality (VR), mobile learning platforms, and geolocation tools, across various educational contexts. The review assessed the pedagogical approaches and the challenges faced in utilizing these technologies and their social impact. **Results:** The results highlight a growing use of digital technologies to address local social issues, with significant applications in environmental sustainability, cultural preservation, and healthcare. At the same time, the review reveals a direct relationship between challenges such as gaps in digital infrastructure, limited digital literacy, and the ineffective use of technology in education. These barriers hinder the full potential of digital tools, despite their effectiveness in place-based learning. The study emphasizes that their contextual relevance and cultural sensitivity heavily influence the effectiveness of digital tools. **Conclusion:** Digital technologies can significantly enhance contextual learning and engage students in solving local social issues. However, future research should focus on bridging the digital divide, creating culturally relevant tools, and promoting co-design processes with local communities, educators, and policymakers to maximize potential. Collaborative efforts should prioritize sustainable and adaptive digital learning solutions that are contextually grounded and technologically accessible.

Keywords: digital technologies, contextual learning, educational technology, social issues, digital literacy.

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■ INTRODUCTION

In an era increasingly defined by digital transformation, the boundaries of human interaction, work, knowledge acquisition, and learning are being fundamentally reimagined. Emerging technologies ranging from artificial intelligence (AI) and the Internet of Things (IoT)

to augmented and virtual reality (AR/VR), machine learning, and mobile applications have moved from being considered a novelty to now being considered a necessity, feeding into everyday life (Kostadimas, Kasapakis, & Kotis, 2025; Soegoto, Rafdhi, Abduh, Rosmaladewi, & Hasitiani, 2025; Zhang et al., 2022). These

tools have dramatically disrupted traditional industries, ushering in new efficiencies and capabilities across sectors such as healthcare, finance, and manufacturing (Akour & Alenezi, 2022; Haleem, Javaid, Qadri, & Suman, 2022; Trenerry et al., 2021). Education, too, has been affected by the widespread availability of smart devices and internet connectivity that enable more dynamic and flexible ways of learning (Alam & Mohanty, 2023). From 2016 to 2025, there has been a marked acceleration in the adoption of digital technologies in education, coinciding with global shifts toward online learning and increased demand for flexible, adaptive educational environments due to factors such as the COVID-19 pandemic and the growing focus on personalized learning pathways.

Educational research has increasingly highlighted the value of digital technologies in allowing for interactive, personalized, and learner-centered experiences with tools that support real-time feedback, immersive environments, and collaborative knowledge building (Bhardwaj, Zhang, Tan, & Pandey, 2025; Kerimbayev, Umirzakova, Shadiev, & Jotsov, 2023). They enable personalized instruction, real-time feedback, immersive simulations, and the acquiring of collaborative knowledge. While gaining momentum globally, much of this focus has centered on science, technology, engineering, and mathematics (STEM) (Barakabitz et al., 2019; Liston, Morrin, Furlong, & Griffin, 2022). This has often overlooked the critical potential of technology in advancing socio-civic competencies, such as social awareness and critical thinking. The use of digital tools to address locally relevant social issues, particularly within contextual learning frameworks, remains an underexplored dimension in formal education (Okada, Sherborne, Panselinas, & Kolionis, 2025; Rodela, Ligtenberg, & Bosma, 2019).

Contextual learning, which emphasizes the relevance of learning content to students' real-

life environments and communities, has long been advocated as a pedagogical approach that encourages a more profound understanding, as well as civic responsibility (Farlina, Nurhayati, & Noor, 2025; Yu & Wang, 2025). When digital tools are embedded within this framework, they can empower students to investigate, represent, and respond to local challenges ranging from environmental concerns and poverty to cultural heritage preservation and community health (Aramburuzabala, Culcasi, & Cerrillo, 2024; Wei, Yuan, & Li, 2024). For example, students might use geolocation technologies to map water quality in their neighborhoods or develop multimedia narratives highlighting traditional knowledge systems (Cinnamon, 2024; Dobesova, Netek, & Masopust, 2022; Li et al., 2022). The fact that the full potential in facilitating such locally relevant learning remains untapped, mainly in current educational practice and research, is a point of contention for many.

This gap is particularly relevant in light of increasing demands for globally connected and locally grounded education. The rise of Generation Z and Generation Alpha (Ramuloo & Ankarla, 2023), immersed in a digitally saturated world, has further amplified the need for educational experiences that are both technologically enriching and contextually meaningful. These generations are acutely aware of social and environmental issues, and their extensive use of digital platforms like TikTok and Instagram has made these tools a key medium for social activism. This digital fluency presents a unique opportunity for schools to leverage students' online engagement to enable civic and community action (D. Smith, Niboshi, Samuell, & Timms, 2024; Motorga, 2023; Rizal, Irwandi, & Muhammad, 2024). However, despite massive digital engagement, systematic studies on how digital technologies specifically support contextual learning of local social issues are still scarce in the literature.

Recent reviews of “digital technology in civic education” and “place-based educational technology” (Alvinca & Suyato, 2025; Yemini, Engel, & Ben Simon, 2025) highlight the potential of digital tools to bridge the gap between global competencies and local engagement. However, these studies often focus on the technological aspects, leaving the critical exploration of how these tools can be integrated into regional, community-rooted education systems relatively underexplored. Understanding how digital platforms, such as social media, can be pedagogically harnessed to maximize local social engagement is key to optimizing educational outcomes for today’s digitally savvy generation.

Moreover, disparities in access to technology, digital literacy, and pedagogical strategies across regions raise questions about equity and inclusivity (Pittman, Severino, DeCarlo-Tecce, & Kiosoglous, 2020; Chen Wang & Si, 2024). While some communities have harnessed digital platforms to enhance awareness and participation in local issues, others struggle with inadequate infrastructure or a lack of culturally relevant digital content (Chowdhury, McLeod, Lihoma, Teferra, & Wato, 2023; Rydzewski, 2025). Understanding existing research in this area is crucial for identifying effective strategies, addressing gaps, and developing future educational solutions that respect local realities and harness technological possibilities.

In light of the evolving educational landscape shaped by digital innovation and the growing urgency to address community-rooted social issues, there is a compelling need to systematically examine how technology is being leveraged within contextual learning environments. Rather than offering fragmented accounts, a structured synthesis of existing scholarship can uncover patterns, gaps, and potentials which bridge the interdisciplinary nature of this problem. The present study adopts a

Systematic Literature Review (SLR) approach to meet this need, consolidating empirical and theoretical contributions exploring the nexus of digital technology, place-based learning, and social relevance in education.

It does not merely catalog the tools and strategies in use, but rather critically investigates how digital interventions are designed, implemented, and experienced across diverse learning contexts. Specifically, it aims to map the educational technologies utilized, analyze the pedagogical models applied, evaluate learner impacts, and identify the challenges encountered in real-world applications. To address these objectives, the inquiry is structured around four core research questions:

- RQ1. What are the prevailing research trends in digital technologies for contextual learning of local social issues?
- RQ2. What digital technologies and pedagogical frameworks are most frequently employed in contextual learning on local social issues?
- RQ3. What challenges and limitations are identified in implementing digital technology for contextual learning of local issues?
- RQ4. What recommendations can be proposed to guide future research and practice in optimizing educational technology for meaningful and locally relevant learning?

By responding to these questions, the review aims to equip educators, scholars, and decision-makers with evidence-based guidance for designing digital learning ecosystems beyond content delivery, cultivating critical consciousness, empathy, and civic engagement among learners.

■ **METHOD**

Research Design

This study follows a Systematic Literature Review (SLR) methodology, rooted in the PRISMA 2020 guidelines (Page et al., 2021). The SLR investigates how digital technologies are

mobilized to enhance contextual learning in response to local social challenges. By systematically identifying, screening, and analyzing the literature, it aims to offer a comprehensive view of innovations, pedagogical practices, and critical knowledge gaps in the field (Moher, Liberati, Tetzlaff, & Altman, 2009; Page et al., 2021). This approach was selected as it can consolidate various educational research strands, ensuring a robust and holistic analysis of the role of digital tools such as mobile applications, augmented reality (AR), virtual reality (VR), geolocation technologies, and social media in learning processes. The review focuses on pedagogical strategies like inquiry-based, place-based, and project-based learning across diverse educational contexts (Asha & Joshith, 2025; Azarian, Yu, Shiferaw, & Stevik, 2023).

Search Strategy

The systematic search for relevant studies was conducted using the Scopus database,

recognized for its extensive indexing of peer-reviewed journals in education and social sciences. The search was limited to studies published between 2016 and 2025. The following keywords were used to ensure comprehensive coverage: “local social issues,” “local wisdom,” “place-based education,” “educational technology,” “digital technology,” and “ICT in education.”

This combination aimed to capture the intersection of local knowledge systems and digital technology, ensuring that studies focusing on contextual learning and technological integration were included. Boolean operators and truncation techniques were also used to refine search results, focusing on titles, abstracts, and keywords. The detailed search strategy is provided in Table 1.

After removing duplicates, the search initially identified 9,596 records, which were then filtered to 2,293 unique publications. The automated filters in Scopus excluded irrelevant

Table 1. Data sources and search strategy for systematic literature review

Data Sources and Search Strategy	
Database	Scopus
Search Period	2016-2025
Keywords	"Local Social Issues", "Local Wisdom", "Place-Based Education", "Educational Technology", "Digital Technology", "ICT in Education"
Keyword Combination	(TITLE-ABS-KEY ("local social issues" OR "local context" OR "place-based education" OR "local wisdom") AND TITLE-ABS-KEY ("digital technology" OR "educational technology" OR "technology-enhanced learning" OR "ICT in education") AND TITLE-ABS-KEY (education)) AND PUBYEAR > 2015 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SRCTYPE , "j"))
Data retrieval date: June 10 th , 2025	

studies based on titles and abstracts, resulting in 1,601 articles for full-text retrieval. After further assessment, only 71 full-text articles met the eligibility criteria and were included in the review process.

Inclusion and Exclusion Criteria

A strict set of inclusion and exclusion criteria was implemented to ensure only high-quality, relevant publications were included. The requirements are detailed in Table 2. After

Table 2. Inclusion and exclusion criteria

Criteria Type	Inclusion Criteria	Exclusion Criteria
Publication Type	Peer-reviewed journal articles.	Editorials, conference abstracts, book chapters, opinion pieces
Timeframe	Published between 2016 and 2025.	Published before 2016 or after 2025.
Language	English.	Non-English publications.
Research Method	Empirical studies (qualitative, quantitative, or mixed-methods), case studies, design-based research, and action research.	Conceptual papers, editorials, or reviews without empirical data.
Technology Use	In educational settings, Studies involve digital tools (e.g., apps, AR/VR, social media, IoT, mobile learning platforms).	Studies do not involve any form of digital technology.
Learning Focus	Addressing local/community-based issues through contextual or situated learning strategies.	General educational use of technology without a focus on local or social issues.
Contextual Relevance	Studies in formal education settings (primary, secondary, higher education) or informal/community-based learning programs.	Studies outside the scope of contextual or locally grounded education.
Data Quality	A clear description of the research design, objectives, and measurable outcomes	Incomplete data, unclear research procedures, or insufficient methodological detail.

applying this criterion, 27 studies were selected for detailed synthesis, representing diverse educational contexts, learner demographics, and sociocultural settings.

Data Analysis

Data extraction was done using a standardized form to maintain consistency across the studies. This form collected key characteristics of each study, such as publication year, author(s), geographical context, research methods, technological tools used, pedagogical approaches, and the outcomes related to contextual learning and social issues. Two independent researchers with expertise in educational technology and contextual learning conducted the extraction process. Any discrepancies between the researchers were resolved through discussion. A third researcher also cross-validated a subset of the extracted data to ensure accuracy and consistency.

Several digital tools were used to assist with organizing, visualizing, and analyzing the data.

Microsoft Excel managed and categorized the study variables (Prasetya et al., 2025; Samala, Rawas, Criollo-C, et al., 2024; Samala, Rawas, Criollo-c, et al., 2024). VOSviewer facilitated bibliometric mapping, allowing for the visualization of relationships between keywords, authors, and journals, and helped identify trends and thematic clusters in the literature (Samala, Papadakis, & Rawas, 2025; Samala, Rawas, Wang, et al., 2024). Additionally, Python was used for text mining and natural language processing (NLP), which helped identify frequent terms, co-occurring keywords, and thematic patterns. Statistical analysis also examined keyword frequency and correlations between technologies and educational contexts. The final synthesis combined qualitative and quantitative methods to focus on emerging patterns, ultimately providing actionable recommendations for stakeholders. The PRISMA flow diagram in Figure 1 illustrates the study selection process.

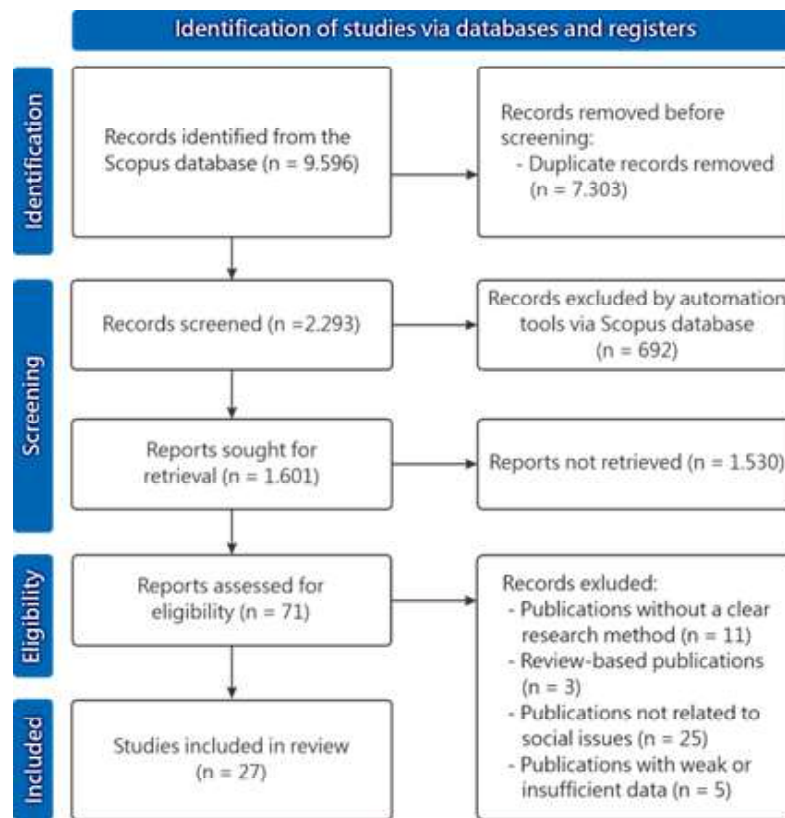


Figure 1. PRISMA flow diagram for the study selection process

■ RESULT AND DISCUSSION

RQ1. What are the prevailing research trends in digital technologies for contextual learning of local social issues?

An in-depth analysis of 27 selected studies reveals a growing academic interest in using digital technologies to support contextual learning that addresses local social challenges. These studies span various global contexts, emphasizing rural and underrepresented communities across Asia, Africa, Europe, and Latin America. A temporal review of publication years (2016–2025) indicates a sharp increase in related research beginning in 2019, peaking in 2023 with six publications (Figure 2). The majority of the studies fall under Social Sciences (26 documents), followed by Computer Science (8), Medicine (6), and Engineering (4), indicating a multidisciplinary convergence around the use of digital technologies to respond to place-based societal

needs (Figure 3). This trend aligns with broader global discourse on equitable education and sustainable development, underscoring a shift toward localization and technology-enabled empowerment.

Across these studies, a recurring pattern is the strategic integration of emerging or context-sensitive technologies such as Virtual Reality (VR), mobile health (mHealth) platforms, community radio, social media, and Open Educational Resources (OER) with pedagogical models grounded in local realities (Adeyeye & Mason, 2020; Boda & Brown, 2020a; Gupta et al., 2023; Ritter, Stone, & Chambers, 2019). For instance, research from Indonesia and Thailand utilized immersive VR and Internet of Educational Things (IoET) devices to embed environmental and cultural knowledge into science and tourism education (Putjorn, Siriaraya, Deravi, & Ang, 2018; Wismantoro et al., 2023). Likewise, mobile

learning and open systems were employed in Nigeria and India to integrate indigenous knowledge and address disparities in access to healthcare (Oke et al., 2023; Tyagi et al., 2023). These examples highlight how digital technologies can serve as culturally responsive tools that enrich learning and promote inclusion.

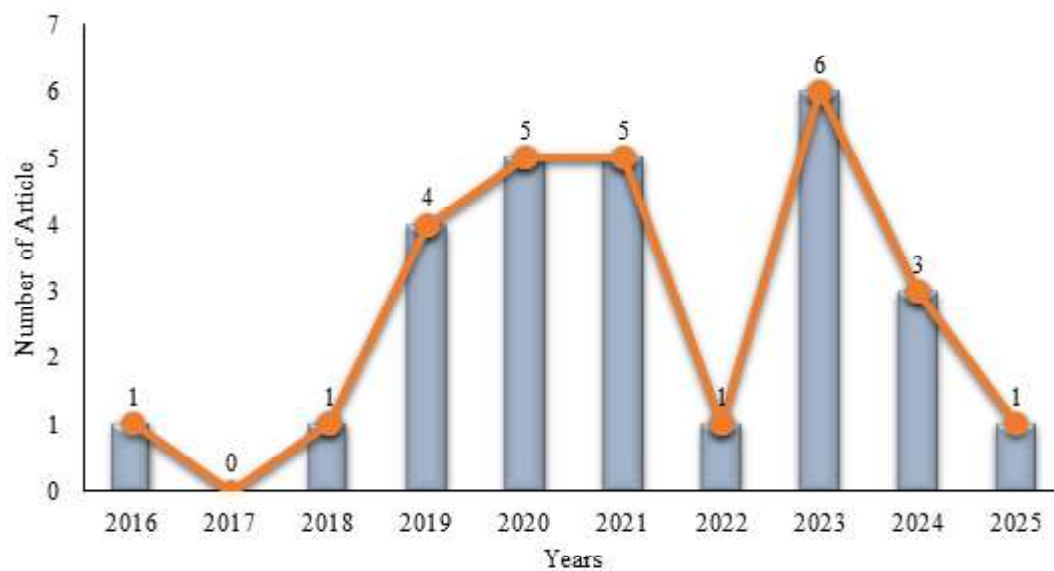


Figure 2. Trends and distribution comparison over time

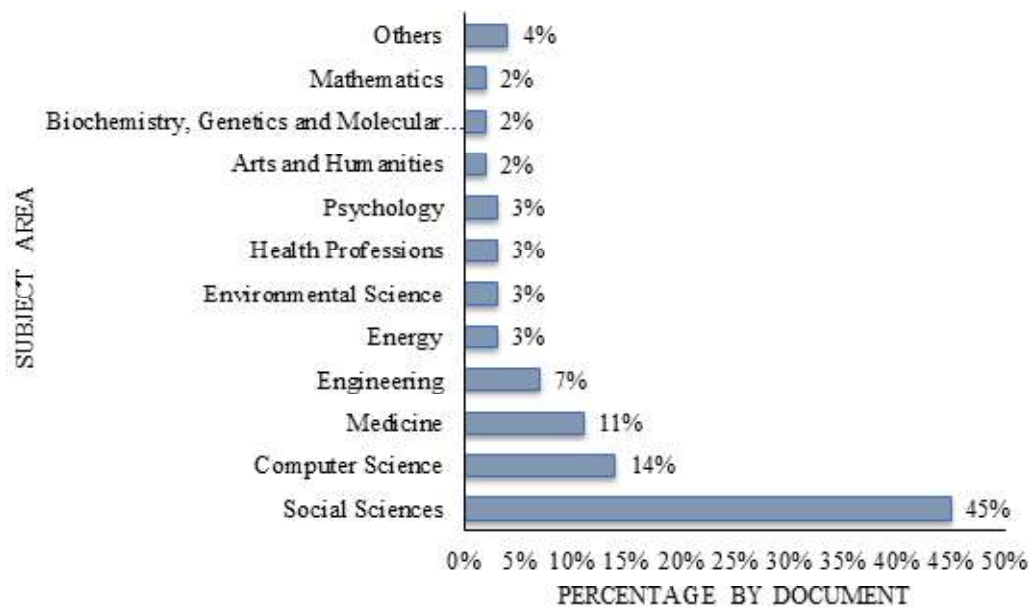


Figure 3. Document distribution by subject area in the selected studies

The geographical distribution of the reviewed studies, as illustrated in Figure 4, further emphasizes the global diversity and reach of these digital interventions. Color-coded countries on the map mark the locations of the studies, with notable clusters in Southeast Asia (e.g.,

Indonesia, Thailand), South Asia (e.g., India), Sub-Saharan Africa (e.g., Nigeria, Uganda), and Latin America (e.g., Brazil, Colombia). Additionally, countries in the Global North, including the United States, Australia, and several European nations, are well-represented, often deploying advanced tools such as VR, data

analytics, and institutional self-assessment technologies. This global mapping offers a comparative lens in which to better understand innovation and disparity.

These spatial patterns reinforce earlier observations on technological inequality. While high-income, urbanized regions tend to



Figure 4. Geographical distribution of reviewed studies on contextual digital technologies for local social issues (2016–2025)

experiment with high-tech, resource-intensive solutions, studies from lower-income or infrastructure-limited regions often employ adaptable, low-cost technologies suited to local constraints. The global reach and diversity of these applications affirm the universality of digital learning to promote equity. They also underscore the importance of designing educational technologies that are both technically effective, while also being socially and culturally resonant.

Table 3 provides a comparative synthesis of these 27 empirical studies by country, technology type, and target issue, offering an insight into how contextually responsive digital tools are crafted to address urgent local challenges while fostering cross-regional knowledge exchange and policy innovation.

In Table 3, the publications are synthesized in terms of theme. It reveals not merely a list of technological applications, but emerging patterns

Table 3. Summary of studies on using digital technologies for contextual learning of local social issues

No	Author	Country/Context	Tech Type	Local Issue Focus
1	(Wong, 2016)	Hong Kong (Primary Education)	Educational Technology (ICT)	Teacher technology acceptance, facilitating conditions

2	(Park, Freeman, & Middleton, 2019)	Australia (Rural Communities)	Internet, Mobile, Satellite	Digital exclusion in rural areas, connectivity challenges, affordability, and service quality
3	(Boda & Brown, 2020b)	USA (Urban, Bay Area)	Virtual Reality (VR 360)	Community Health, Ecology, Environment
4	(Kusumastuti, Pranita, Viendyasari, Rasul, & Sarjana, 2024)	Indonesia (Kenderan Village, Bali)	ICT, Digital Technology, Circular Economy	Sustainable Tourism, Community Empowerment, Local Wisdom
5	(Maindal et al., 2021)	Denmark	Digital App, Family Wheel	Gestational Diabetes Mellitus (GDM)
6	(Skulmowski & Standl, 2021)	Germany, Karlsruhe University	Digital Technology (Website Analytics)	COVID-19 Information Fatigue at the University Level
7	(Bocconi, Panesi, & Kampylis, 2020)	Italy	Digital Self-Reflection Tool (SELFIE)	Digital capacity of schools, integration of digital technologies
8	(Boda & Brown, 2020a)	USA (Urban, Bay Area)	Virtual Reality (VR) 360	Science Education, Racial Disparities in Education
9	(García-Perdomo, 2021)	Colombia	Digital Media, Social Media, Video Platforms	Television news, online transition, and audience interaction
10	(Ritter et al., 2019)	Lafayette, Louisiana	Virtual Reality (VR), 360-degree video	Environmental issues (erosion, renewable resources)
11	(Eppard, Kaviani, Bowles, & Johnson, 2021)	United Arab Emirates (UAE)	Educational Technology (Mobile apps)	Cultural and linguistic adaptation in education: addressing barriers for Emirati students
12	(Cibin et al., 2020)	Portugal, Romania, Ireland	FM Radio, Peer-to-Peer Platforms (RootIO), Telephone	Community Radio, Media Pluralism, Local Engagement, Civic Participation, Linguistic Diversity
13	(Putjorn et al., 2018)	Thailand (Rural Schools)	Sensor-based IoT (OBSY)	Education inequality in rural Thailand, Local context (hill tribes)
14	(Wismantoro et al., 2023)	Indonesia (Central Java, Kebon Indah Village)	Virtual Reality (VR)	Sustainable tourism, local wisdom, and environmental preservation
15	(Tyagi et al., 2023)	India (Rural Sehore, Madhya Pradesh)	Mobile app, Learning Management System (Moodle)	Early detection and referral of schizophrenia
16	(Gustafsson, 2022)	Sweden (municipalities)	Digital devices, Learning platforms (digitalization)	School digitalization in rural areas
17	(Adeyeye & Mason, 2020)	Nigeria (Africa)	Digital technologies, Open Educational Resources (OER), Open Distance Learning (ODL)	Indigenous Knowledge, Sustainability, Agriculture, Health, Development
18	(Jerónimo, Correia, & Gradim, 2022)	Portugal (Local Journalism)	Digital tools (social media, mobile, internet)	Local media, social media, and community engagement
19	(Luckner, Purgathofer, & Fitzpatrick, 2019)	Austria (Higher Education, TEL)	Technology-enhanced learning (TEL): Learning platforms	Student-centered design, Learning platform development

20	(Gupta et al., 2023)	Uganda	Mobile Health (mHealth), Fingerprint Scanning, SMS	Tuberculosis (TB), HIV
21	(Olufson, Ottrey, Green, & Young, 2023)	Australia (Queensland)	Digital Systems (Menu Management, Digital Health Records)	Nutrition Care Systems, Rehabilitation
22	(Nofrizal et al., 2024)	Indonesia (Riau Province)	Digital Platforms, Social Media, Digital Promotion	Cultural Preservation, Traditional Sports, Regional Identity
23	(Dewi, Erna, Martini, Haris, & Kundera, 2021)	Indonesia	Ethnoscience-based learning technology	Scientific Literacy, Cultural Context, Local Wisdom
24	(Ibrahim & Wahab, 2021)	Malaysia (Radio Industry)	Digital Radio, Internet Radio, Satellite Broadcasting	Media Transformation, Digitalization, Local Communication
25	(Oke et al., 2023)	Nigeria (Construction)	Automation, Robotics, Drones, Exoskeletons, Off-site Construction Systems	Skilled Labor Shortage, Worker Safety, Cost Efficiency
26	(Layer et al., 2023)	Zanzibar, Tanzania	Mobile app, Digital Health Platform (Community Health Toolkit)	Maternal Health, Child Health, Health Systems Strengthening
27	(Martin, 2021)	Brazil	Mobile Learning (M-learning), BYOD	EFL (English as a Foreign Language), Communication Skills

that reflect a deeper socio-technical dynamic in addressing local social issues through digital innovation. Rather than functioning as isolated examples, these studies collectively highlight the multifaceted role of digital technologies, ranging from immersive tools to low-tech media in facilitating contextual learning, civic engagement, and social equity.

A prominent theme is the rise of immersive technologies such as virtual reality (VR) and 360-degree video. These tools are not limited to enhancing learning experiences but are strategically used to promote empathy and community awareness around the topics of urban health, inequality, and sustainability. For instance, Boda and Brown (2020b) and Ritter et al. (2019) demonstrate how immersive media simulate real-life contexts to challenge abstract pedagogy in urban US classrooms, while Wismantoro et al. (2023) apply similar tools to promote sustainable tourism in Java. These practices align with constructivist learning theories, emphasizing place-based and experiential learning.

In contrast, low-cost and accessible technologies such as mHealth (mobile health), SMS-based systems, and community radio shows take up in rural and developing regions. In Uganda, mHealth interventions using SMS and fingerprint tools addressed gaps in TB and HIV monitoring (Gupta et al., 2023), while in Thailand, sensor-based IoET systems support inclusive education in marginalized communities (Putjorn et al., 2018). As highlighted by Cibin et al. (2020), radio served not only as a pedagogical medium but also as a means of cultural preservation. These examples collectively challenge dominant narratives of technological determinism, which assume a linear, top-down flow of innovation from developed to developing contexts. Instead, they exemplify the principles of Appropriate Technology and Socio-technical Systems Theory, which stress user-context fit and the collaborative adaptation of tools to local needs.

Comparatively, Open Educational Resources (OER) and Open and Distance

Learning (ODL) frameworks also show versatility across settings. In Nigeria, (Adeyeye & Mason, 2020) report how OER supports localized agricultural and health knowledge rooted in indigenous practices. Similarly, in Indonesia, the use of digital tools to document traditional sports and implement ethnoscience-based learning (Dewi et al., 2021; Nofrizal et al., 2024) illustrates how educational technology can support decolonized knowledge systems.

In institutional contexts with more advanced infrastructure, technology is often framed as a means to enhance capacity and teacher agency. SELFIE (Bocconi et al., 2020), a digital self-assessment tool in Italian schools, and a form of mobile technology supporting linguistic and cultural adaptation in the United Arab Emirates (Eppard et al., 2021), demonstrate this institutional strengthening. However, such opportunities may not be as accessible to under-resourced schools, highlighting persistent global inequalities.

Digital innovation in public health has also advanced significantly, with technologies tailored to address community-specific health concerns. To cite a number of examples, a mobile application was developed in Denmark for gestational diabetes management (Maindal et al., 2021). In India, learning management systems were used for the early detection of schizophrenia (Tyagi et al., 2023). Meanwhile, the Community Health Toolkit was implemented in Zanzibar to enhance maternal and child healthcare services (Layer et al., 2023).

These disparities are particularly evident when comparing the application of high-tech tools

like VR and Big Data analytics in urban Europe (Luckner et al., 2019; Skulmowski & Standl, 2021) with the adaptive use of low-bandwidth tools in Southeast Asia, Africa, and Latin America (Adeyeye & Mason, 2020; Martin, 2021; Park et al., 2019) This reinforces the argument for context-sensitive, bottom-up design in digital educational policies and underscores the need to rethink “innovation” not as the latest technology, but as the most effective for a given context..

Theoretically, these findings provide a counter-narrative to dominant techno-centric discourses by emphasizing community-driven, culturally embedded approaches. They validate the relevance of frameworks like Appropriate Technology and Socio-technical Systems Theory, advocating for participatory, equitable, and context-aware design principles in digital education. Ultimately, current research trends indicate a paradigm shift from technologically-driven to human-centered digital education where innovation is measured not only in terms of novelty, but by its relevance to local realities, cultural continuity, and transformative potential in diverse learning environments..

RQ2. What digital technologies and pedagogical frameworks are most frequently employed in contextual learning on local social issues?

By analyzing 27 peer-reviewed studies (Table 4), a pattern of dominant approaches and tools emerges, offering insights into both prevalent educational strategies and the contextual responsiveness of technology-enhanced learning interventions.

Table 4. Summary of pedagogical frameworks and digital technologies in reviewed studies

No	Author	Pedagogical Framework	Method	Key Findings
1	(Wong, 2016)	Technology Acceptance Model (TAM)	Structural Equation Modeling, Survey	Facilitating conditions are key for tech acceptance; ease of use and usefulness have weak effects.

2	(Park et al., 2019)	Focus on Digital Inclusion	Fieldwork, Interviews, Focus Groups	Poor internet access limits rural digital inclusion; policy improvements are needed.
3	(Boda & Brown, 2020b)	Design-Based Research (DBR)	Mixed-Methods (Quantitative & Qualitative)	VR 360 videos improve science attitudes through local relevance.
4	(Kusumastuti et al., 2024)	Post-Smart Tourism Development (PSTD)	Mixed-Method Research (MMR)	Digital competence and events enhance sustainable smart tourism.
5	(Maindal et al., 2021)	Co-production, Health Promotion	Intervention testing, pilot studies	Digital and family tools support diabetes prevention and health literacy.
6	(Skulmowski & Standl, 2021)	Information delivery and digital communication strategies	Web page data analysis, Page views, search data analysis, Time-series data	Information fatigue affects COVID-19 info consumption and personalized delivery.
7	(Bocconi et al., 2020)	DigCompOrg Framework, Digital Competence Framework	Pilot study, survey (questionnaires for school leaders, teachers, and students)	SELFIE reveals school strengths and gaps in digital competence.
8	(Boda & Brown, 2020a)	Design-Based Research (DBR), Context-Specific Learning	Mixed Methods (Quantitative: MANCOVA, Qualitative: Student Interviews)	Context-specific VR boosts science engagement, especially for disengaged students.
9	(García-Perdomo, 2021)	Socio-technical approach	Ethnography, Participant Observation, In-depth Interviews	Digital transition in news media reshapes journalism and audience interaction.
10	(Ritter et al., 2019)	Place-based Education, Experiential Learning, Constructivism	Mixed methods (quantitative and qualitative)	VR curriculum increases eco-literacy; tech improvements are needed.
11	(Eppard et al., 2021)	Culturally Responsive Pedagogy (CRP)	Qualitative research; Case studies	Culturally relevant content and language are key for effective edtech.
12	(Cibin et al., 2020)	Participatory Design (PD), Commons-based Peer Production, Conviviality	Participatory Design, Case Study, Community Engagement	Low-cost digital tools empower rural radio via participatory design.
13	(Putjorn et al., 2018)	Inquiry-based learning, Hands-on learning	Quantitative evaluation, Regression analysis	IoET improves STEM learning; tech experience is not a significant factor.
14	(Wismantoro et al., 2023)	Immersive, experiential learning	Survey with purposive sampling (204 respondents)	VR boosts interest in sustainable tourism; portability matters more than content.
15	(Tyagi et al., 2023)	Task-sharing model for mental health care	Qualitative (Focus groups, thematic analysis, content adaptation, iterative feedback)	Digital training enhances mental health literacy in rural India.
16	(Gustafsson, 2022)	Policy translation, Local governance in education	Qualitative (Comparative cross-case study, interviews, document analysis)	Local context drives different implementations of national digital policy.
17	(Adeyeye & Mason, 2020)	Integrating Indigenous Knowledge with Modern Technology	Qualitative, Conceptual Framework	Digital tech can preserve African Indigenous Knowledge in education.

18	(Jerónimo et al., 2022)	Proximity journalism, community engagement	Survey (n=107)	Local journalists use digital tools but lack community engagement.
19	(Luckner et al., 2019)	Co-creation, Participatory Design, Self-directed learning	Design-based Research (DBR), Co-creation with students	Student co-creation improves learning engagement and relevance.
20	(Gupta et al., 2023)	Community Engagement, Behavior Change Models	Case Study, Hybrid Implementation-Effectiveness Trial, Mixed-Methods Evaluation	mHealth tech shows potential despite limited impact on outcomes.
21	(Olufson et al., 2023)	Complex Adaptive Systems, Reflexive Thematic Analysis	Ethnographic Study (Observations and Interviews)	Digital tools aid flexibility but challenge person-centered care.
22	(Nofrizal et al., 2024)	Local Content Curriculum, Community-Based Education	Qualitative Research (Interviews, Observations)	Digital platforms preserve traditional sports and support tourism.
23	(Dewi et al., 2021)	Contextual Collaborative Learning-Based Ethnoscience (CCLBE)	Pre-experimental Design (One Group Pretest-Posttest), T-test, N-Gain Analysis	CCLBE boosts students' scientific literacy, especially in the environment.
24	(Ibrahim & Wahab, 2021)	Digital Disruption, Media Evolution	Qualitative Research (Interviews)	Digital radio adoption is slow due to resistance and infrastructure.
25	(Oke et al., 2023)	Contextual Learning (Indirect)	Mixed-Method (Qualitative & Quantitative)	Culture, skills, and cost drive automation in construction.
26	(Layer et al., 2023)	Community Health, Digital Health	Mixed-Method (Qualitative & Quantitative)	The mobile app improves maternal and child health in Zanzibar.
27	(Martin, 2021)	Partnering Pedagogy, Student-Centered Learning	Lesson Plan (Qualitative)	Mobile learning promotes teen speaking and collaboration.

A recurring pedagogical framework is Design-Based Research (DBR), highlighted in studies by Boda & Brown (2020a, 2020b) and Luckner et al. (2019). This iterative and collaborative approach is often used to develop, implement, and refine educational innovations tailored to specific local issues, such as improving science engagement through locally relevant VR content or student co-creation in the learning process. In addition, Participatory Design (PD) and Community Engagement Frameworks (Cibin et al., 2020; Gupta et al., 2023; Layer et al., 2023) emphasize user involvement and local relevance, particularly in rural or underserved communities. These pedagogies align with principles of empowerment and inclusivity, especially in culturally diverse settings.

In terms of digital technologies, Virtual Reality (VR) emerges as a frequently applied tool, as seen in studies by Boda & Brown (2020b), Ritter et al. (2019), and Wismantoro et al. (2023). VR is noted for its ability to stimulate immersive, experiential learning that enhances motivation and ecological or tourism literacy, particularly when contextualized to learners' local environments. Other frequently utilized technologies include mobile learning applications (Layer et al., 2023; Martin, 2021), mHealth tools (Maindal et al., 2021; Tyagi et al., 2023), and digital platforms for local content preservation (Adeyeye & Mason, 2020; Nofrizal et al., 2024).

Frameworks like Culturally Responsive Pedagogy (Eppard et al., 2021), Place-based Education (Ritter et al., 2019), and Contextual

Figure 5 illustrates the results of a bibliometric analysis of the 27 reviewed studies using VOSviewer, focusing on the most frequently co-occurring keywords and their conceptual relationships. Figure 5a presents the network visualization, while Figure 5b highlights the density of keyword occurrences.

The strength of VOSviewer lies in its ability to quantify keyword frequency, its capacity to identify clusters of closely related concepts, and the interconnectivity between them. In this review, the visualization confirms that contextual education through digital technologies is a multidisciplinary field, intersecting various thematic domains (Bryda & Costa, 2023; Mhlongo, Mbatha, Ramatsetse, & Dlamini, 2023; Chengliang Wang, Chen, Yu, Liu, & Jing, 2024). Central keywords such as “educational technology,” “digital technology,” and “students” occupy highly interconnected positions, reflecting a sustained focus on learning systems and user engagement (Fang, Li, Chan, & Kalogeropoulos, 2024; Masa’deh et al., 2024).

Meanwhile, terms such as “local wisdom,” “place-based education,” and “curriculum” form a distinct conceptual cluster that integrates cultural and contextual dimensions into digital pedagogy, particularly in studies from Indonesia and India that leverage indigenous knowledge in education (Kusumastuti et al., 2024; Nofrizal et al., 2024; Tyagi et al., 2023; Wismantoro et al., 2023). The proximity between this cluster and terms like “virtual reality” and “design-based research” suggests the emergence of hybrid pedagogical innovations, where immersive technologies are used to simulate local realities, thus enhancing contextual learning environments (Daðhan & Gündüz, 2022; Vuorio, 2024; J. Wang, Mokmin, & Ji, 2025).

The distance between specific terms, such as “FM radio,” “sensor networks,” and “artificial intelligence,” reveals that some technologies are still treated as context-specific or specialized tools, rather than being fully integrated into broader

educational frameworks. However, these individual terms may help connect grassroots initiatives to emerging digital infrastructures in future research.

The density map (Figure 5b) highlights the intensity of interest around terms like “human,” “learning,” and “curriculum,” reaffirming the human-centered nature of many of the reviewed studies. Overall, this cluster-based and proximity-aware analysis offers a descriptive map of research activity and a strategic lens for identifying theoretical connections, underexplored intersections, and pathways for future interdisciplinary work.

RQ3. What challenges and limitations are identified in implementing digital technology for contextual learning of local issues?

The analysis of several studies reveals a broad spectrum of recurring challenges and limitations on this topic, particularly when addressing local social issues. These challenges span across technical, infrastructural, cultural, pedagogical, and institutional domains that critically influence the adoption, effectiveness, and sustainability of digital interventions (Chugh, Turnbull, Cowling, Vanderburg, & Vanderburg, 2023; Makda, 2024; Sahni, Verma, & Kaurav, 2024).

Infrastructure-related challenges such as limited internet access, outdated devices, and inconsistent electricity supply are particularly prevalent in rural or under-resourced areas (Gustafsson, 2022; Park et al., 2019; Wong, 2016). However, some studies point to more profound structural inequalities that persist even after improving basic connectivity. For example, in Indonesia and Australia, digital exclusion continues due to persistent socio-economic disparities (Kusumastuti et al., 2024; Park et al., 2019), revealing that infrastructure alone does not resolve the issue.

Culturally, a paradox emerges. While digital tools are often positioned as vehicles for cultural

preservation, several studies reveal tensions between globalized digital platforms and local values. Open-access tools such as OERs and mobile applications risk cultural misrepresentation or oversimplification when developed without adequate community engagement (Adeyeye & Mason, 2020; Oke et al., 2023). This raises a key tension between cultural continuity and digital standardization, yet few studies explicitly address how to navigate or resolve this paradox.

Pedagogically, resistance to technology adoption among educators, especially in conservative or religious settings, is not simply a technical skill issue. Instead, it reflects deeper ideological concerns, including fears about the erosion of the structures of traditional authority or pedagogical control (Adeyeye & Mason, 2020; Eppard et al., 2021; Oke et al., 2023). These concerns contribute to selective or superficial technology adoption and are rarely explored in-depth in the reviewed literature.

From a technological perspective, usability and content relevance limitations remain significant concerns. VR tools have been critiqued for producing generic, non-localized experiences that fail to connect with learners' lived realities (Boda & Brown, 2020a; Jerónimo et al., 2022; Olufson et al., 2023). Likewise, mHealth applications, while innovative, often face challenges in integrating with community health practices due to literacy gaps, language barriers, and device incompatibility (Gupta et al., 2023). Moreover, the assumption that digital innovation inherently leads to positive outcomes is challenged by studies documenting unintended effects, such as screen fatigue, information overload, reduced motivation, and even physical discomfort (e.g., motion sickness from VR tools) (García-Perdomo, 2021; Skulmowski & Standl, 2021). Yet, longitudinal analyses of these issues and their long-term impact on learner well-being are notably absent across the 27 studies.

Institutionally, a significant gap is the lack of sustainable planning and policy support.

Without consistent funding, strategic frameworks, and alignment across actors, many digital initiatives stagnate or become obsolete (Martin, 2021; Wismantoro et al., 2023). However, only a minority of studies examine institutional governance structures, policy environments, or implementation ecosystems, all of which constitute a significant research gap.

These findings challenge the dominant techno-deterministic narrative that equates digitalization with linear educational progress. Instead, they highlight the need to adopt more context-sensitive theoretical perspectives, such as Appropriate Technology, which advocates for low-cost, community-aligned, scalable tools, or Socio-technical Systems Theory, which recognizes the interdependence between technology and its surrounding cultural, political, and institutional systems.

RQ4. What recommendations can be proposed to guide future research and practice in optimizing educational technology for meaningful and locally relevant learning?

Each recommendation below addresses a specific limitation identified in RQ3, revealing gaps in the existing literature that future research must address. To overcome infrastructure challenges and digital exclusion, particularly in underserved regions, future practice should focus on expanding connectivity and addressing systemic socio-economic barriers to digital participation (Arion et al., 2024; Choudhary & Bansal, 2022). Equitable access must be coupled with digital literacy programs tailored to local needs and capabilities (Kusumastuti et al., 2024; Park et al., 2019).

Developers should prioritize co-creating content with local communities to resolve cultural tensions between digital standardization and regional identity. Future studies should explore frameworks for incorporating indigenous knowledge systems and culturally relevant pedagogies into digital platforms (Adeyeye &

Mason, 2020; Bocconi et al., 2020; Jerónimo et al., 2022; Nofrizal et al., 2024), despite there being a significant gap in the literature on this topic.

Addressing educator resistance requires more than training; it demands rethinking professional development as a culturally situated, reflective practice. Going forward, research should investigate how to empower educators in traditional settings without undermining their values or authority, an area still underexplored in current literature (Eppard et al., 2021; Maindal et al., 2021).

To tackle content irrelevance and usability issues, future digital tools must be adaptive, localized, and responsive to learners' evolving needs. This includes developing machine-learning-powered personalization and emotionally intelligent interfaces to sustain engagement and avoid fatigue (Skulmowski & Standl, 2021; Tyagi et al., 2023). Similarly to those above, there remains a lack of discussion in the reviewed studies on this issue.

In response to the problem of unsustainable projects, research should explore low-cost, low-maintenance technologies that require minimal infrastructure and can be community-managed (Gupta et al., 2023; Martin, 2021). Equally important is establishing clear policy ecosystems and funding mechanisms supporting long-term integration. Yet, only a few studies have addressed building institutional capacity or securing multi-stakeholder commitment (Bocconi et al., 2020; Layer et al., 2023).

Finally, a recommendation that applies across the board is the need for longitudinal and impact-oriented research. Across the 27 studies, few systematically measure long-term outcomes, learner trajectories, or the sustainability of digital engagement over time. There is also limited comparative work on the differential impact of specific technologies (e.g., VR vs mHealth vs OER), which is essential for future policy and investment decisions.

By directly linking each recommendation to the core challenges identified in RQ3, this review contributes a coherent, theory-informed, and actionable roadmap for advancing research and practice in educational technology. Developing meaningful, equitable, and sustainable digital learning requires an integrated approach that centers local voices, adapts to contextual constraints, and challenges dominant paradigms of digital progress.

■ LIMITATIONS OF THE REVIEW

While this review presents a comprehensive synthesis of current trends in digital technologies for contextual learning of local social issues, it is important to acknowledge several limitations that may influence the interpretation, depth, and generalizability of the findings. One major limitation lies in the exclusive reliance on the Scopus database for the literature search. Although Scopus is widely regarded for its robust indexing of peer-reviewed journals, this singular dependency may have inadvertently excluded relevant studies in other scholarly databases such as Web of Science, ERIC, or regional repositories like the ASEAN Citation Index and DOAJ. As a result, the diversity of perspectives, especially those from local and community-based sources in the Global South, might not have been fully captured.

In addition, the review limited its inclusion criteria to English-language publications. This linguistic restriction potentially overlooks studies published in other languages, including Bahasa, Spanish, Portuguese, or French, which may contain rich, context-specific insights into grassroots innovations and community-centered educational practices. Language bias may contribute to an Anglophone-centric narrative, underrepresenting culturally diverse approaches and knowledge systems throughout other parts of the world.

Another notable limitation is the restricted access to full-text articles. Of the 1,601 articles

screened for eligibility, only 71 could be accessed and reviewed in full, primarily due to institutional paywalls and access limitations. This may have excluded high-quality studies from the final analysis, particularly those originating from institutions or regions with limited open-access resources, thereby affecting the comprehensiveness of the synthesis.

Furthermore, the review exclusively focused on peer-reviewed journal articles and did not incorporate grey literature, such as project reports, policy documents, and practitioner reflections. While this decision enhances academic rigor, it may also introduce publication bias by favoring formally published studies over practical, community-driven, or policy-relevant contributions, especially critical in applied educational contexts.

While ensuring contemporary relevance, the review's timeframe spans from 2016 to 2025 and might have omitted foundational works or pilot studies prior to 2016 that helped shape the theoretical and methodological landscape of contextual digital learning. Moreover, articles published toward the end of 2025 may not have been indexed during data retrieval (June 2025), potentially excluding the most recent developments and innovations from the analysis.

It is also essential to consider the influence of the researcher's subjectivity. The reviewers' expertise in educational technology and contextual learning shaped the thematic focus and interpretation of findings. Although validation across various persons and cross-checking were employed, inherent biases in data screening and synthesis processes may have influenced which patterns and themes were emphasized.

Lastly, most studies in this review offer short-term, single-case insights, lacking longitudinal perspectives or comparative analysis across diverse educational environments. This limitation restricts the review's ability to assess long-term impacts or understand the sustained effectiveness of specific digital interventions across

contexts and populations, highlighting the need for more robust, longitudinal, and multi-site research in the future.

Despite these limitations, the review remains a valuable contribution to the field, offering a theory-informed, evidence-based overview of how digital tools are currently leveraged to support locally relevant and socially conscious learning. Nevertheless, readers are encouraged to interpret the findings within the context of these limitations and to consider further empirical research to address the gaps which have been identified above.

■ CONCLUSION

This review has demonstrated the growing significance of digital technologies in enhancing contextual learning related to local social issues. By synthesizing findings from 27 peer-reviewed studies across diverse educational and sociocultural settings, this study makes a key contribution by mapping how tools such as Virtual Reality (VR), mobile learning platforms, mHealth applications, and geolocation technologies are increasingly employed to support place-based education, environmental literacy, cultural preservation, and local health awareness. These technologies, when designed and implemented with contextual sensitivity, have the capacity not only to increase student engagement and motivation but also to advance civic consciousness and local problem-solving skills.

The review finds that digital tools are most impactful when co-designed with local communities, aligned with indigenous knowledge systems, and embedded within pedagogical frameworks such as design-based research, participatory design, and culturally responsive pedagogy. However, persistent digital infrastructure gaps, limited digital literacy, a lack of sustainable policy support, and a mismatch between globalized content and local values often undermine this potential. These challenges signal the need for a more nuanced, equity-driven

approach to design and deployment in educational technology.

Building on this review, our subsequent research will involve developing and testing a pedagogical framework for culturally grounded digital learning, which integrates participatory design principles and supports educators in under-resourced communities. This framework will be evaluated through the implementation of pilot studies in rural and urban schools, examining learning outcomes, user satisfaction, cultural alignment, and scalability.

Future studies should investigate how machine learning-enabled adaptive systems can personalize learning in ways that respect local values and linguistic diversity, especially in low-literacy contexts. In addition, there is a critical need for longitudinal and impact-oriented studies to assess the sustained effects of digital interventions over time. Researchers should also explore ethical and practical considerations surrounding emotionally intelligent interfaces and algorithm-driven content delivery.

To support these developments, policymakers must move beyond general calls for “supportive environments” and instead invest in specific initiatives, which may include, (1) funding low-cost, low-bandwidth infrastructure that suits local needs, (2) creating policy incentives for schools to adopt co-designed technologies, and (3) establishing community-based digital literacy programs that are age-appropriate and culturally relevant. Furthermore, cross-sector collaboration among education departments, local governments, NGOs, and technology developers will ensure that innovations are technically feasible and socially sustainable.

Overall, advancing digital contextual learning requires rethinking innovation, not as the newest or most advanced technology, but as the most appropriate, inclusive, and empowering for the learners it aims to serve. Only by centering local voices, fostering co-design, and aligning tools with local educational and cultural landscapes can

digital technologies become true catalysts for equity, sustainability, and transformative education.

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